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The Mining Journal

LONDON, MARCH 18, 1960

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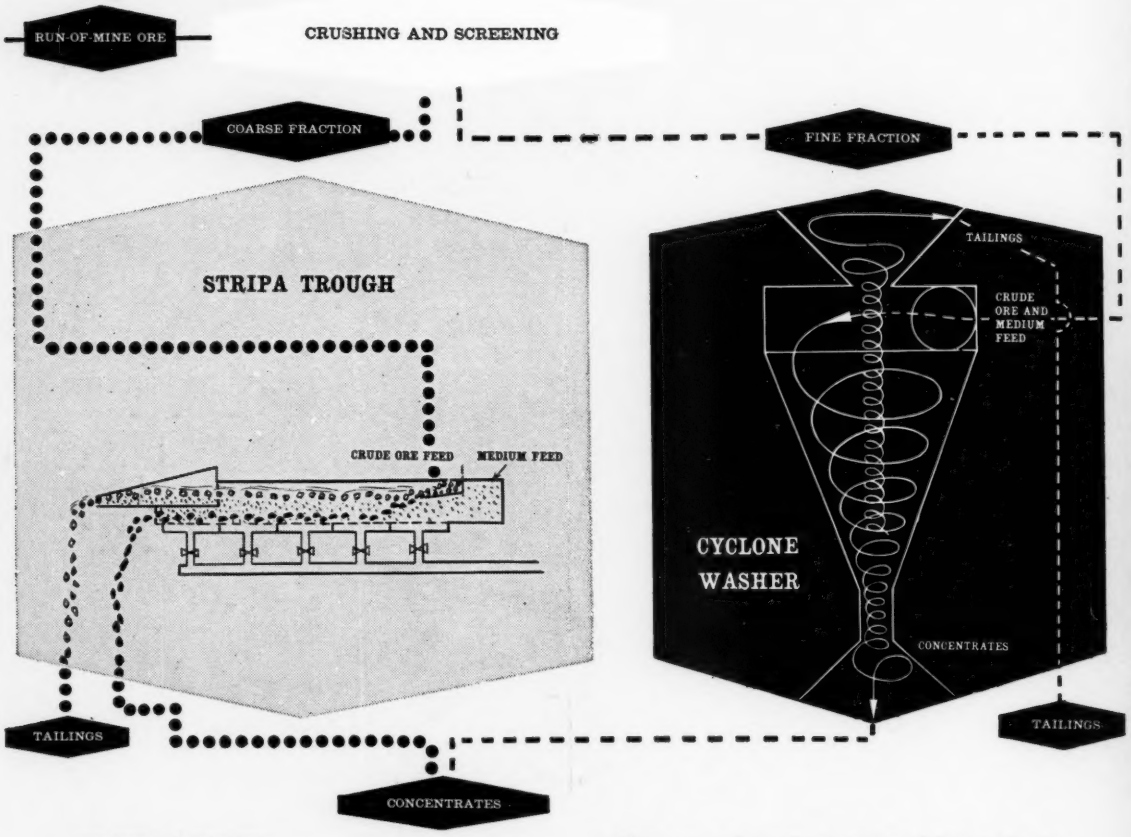

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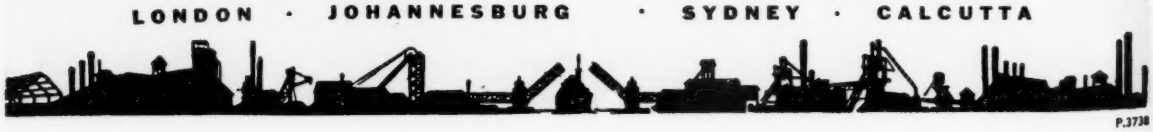

P.3738

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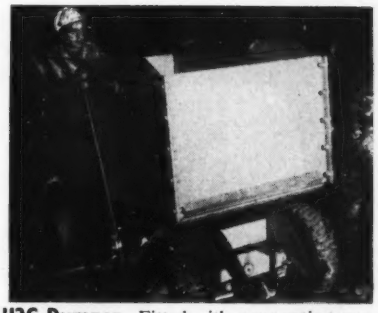

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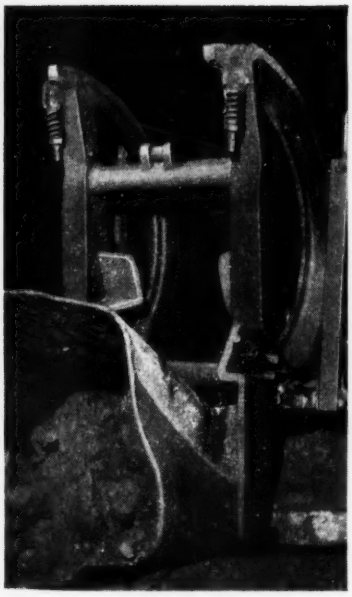

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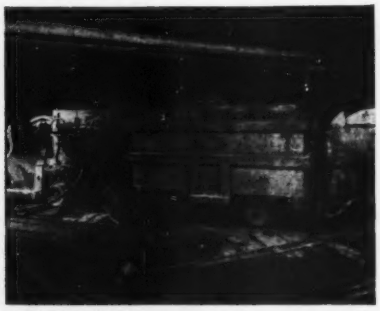

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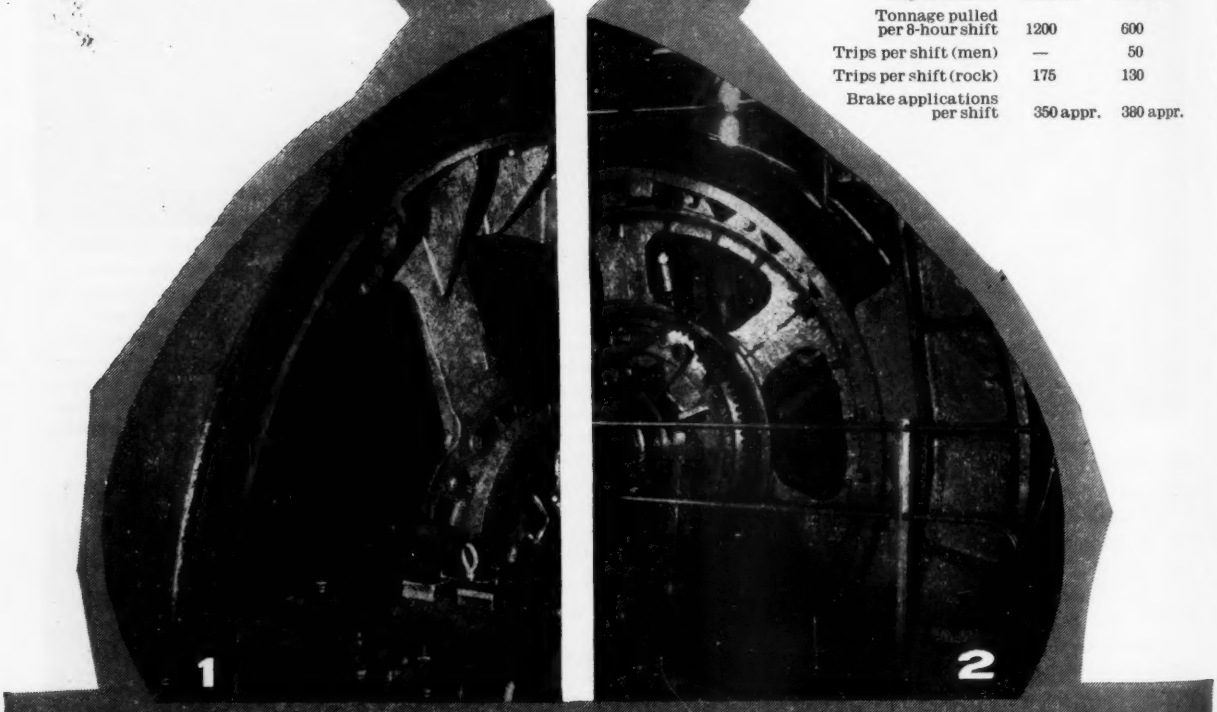

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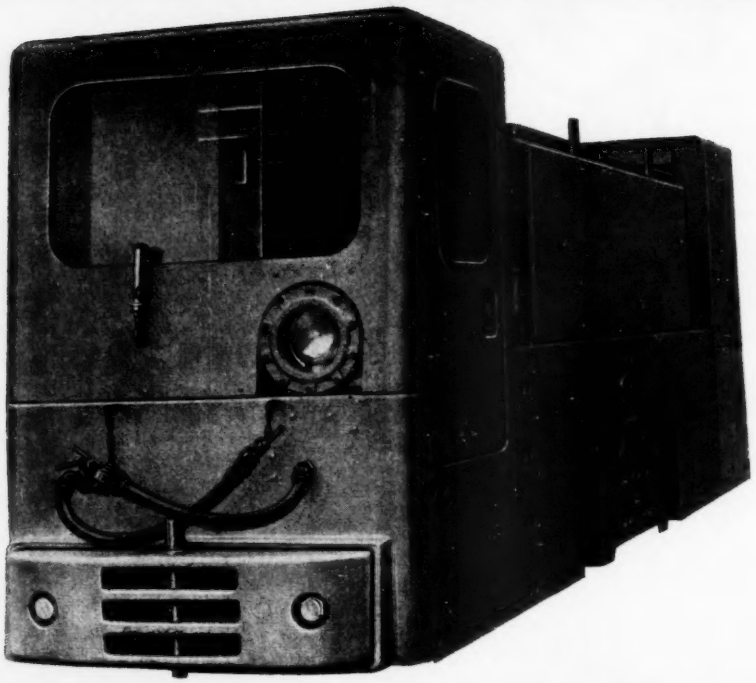

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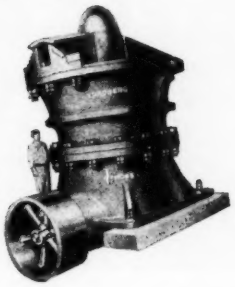

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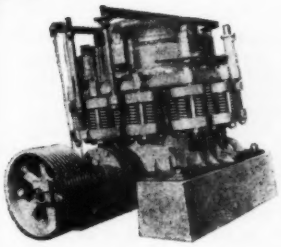

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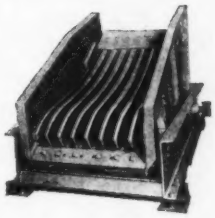

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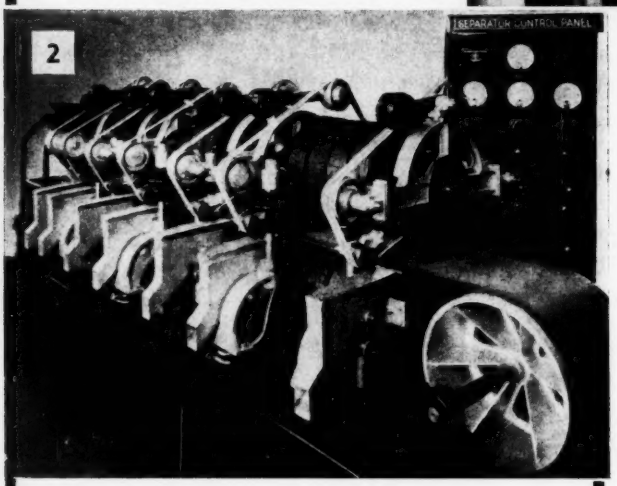

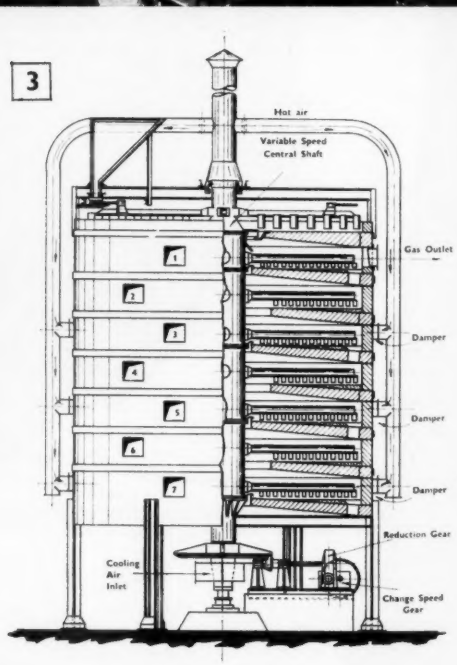

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The Mining Journal

London, March 18, 1960

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Vol. 254 **No. 6500**

Established 1835

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Circulation
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Published each Friday by
THE MINING JOURNAL LTD.

Directors
E. Baliol Scott (*Chairman*)
U. Baliol Scott (*Managing*)
G. A. Baliol Scott
R. A. Ellefsen

15 WILSON STREET, LONDON, E.C.2

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Annual Subscription £3 10s. Single copy ninepence

The Congo in Transition

THE consequences of the Belgian Congo's breathtakingly rapid progress towards independence cannot fail to be of concern to all those whose interests lie in Africa.

If the transition occurs peaceably and if the good sense exhibited by the Congolese at the Brussels round table conference is carried over into an intelligent utilization of the Belgian civil servants whose competence is available for the asking, the coming of independence to the Congo could well be a step of major importance not only in the political advancement of the African but still more in guiding emergent Africa into the western alliance. Africa is now the only largely uncommitted continent in the struggle of East against West. If the East were ever to get control of Africa, the West would inevitably become overshadowed both politically and, in all probability, economically. This is the stark reality behind Mr. Macmillan's African odyssey and President de Gaulle's flights to Algeria no less than behind the recent emergence of independent republics in French West and Equatorial Africa and current events in the Congo.

The mining investor in Britain and on the Continent is no mere spectator to these events. It is very largely his money, together in some territories with American foreign aid, that has developed the large mining enterprises throughout Africa which are unavoidably involved in the changing political picture—involved as the developers of Africa's main source of natural wealth, as major employers of labour and as payers of taxes without which government in many of these territories, would become impossible. Over large areas of Africa the mining interest is indispensable to continued economic well-being and to orderly government. This remains true whether the government is that of a colonial power or of an independent state. Moreover, it is of vital concern to these governments that the confidence of the investor should remain unshaken in the political and fiscal climate within which his company must operate.

Thus the Ghanian Government has hitherto shown a notable understanding of the economic realities which confront any government dependent on foreign capital for the development of its natural resources. By contrast, the present low price of Union Minière shares coupled with the general nervousness which the Continental investor has been exhibiting towards copper and gold mining investments in Southern Africa, suggests some doubts regarding the clarity of vision to be expected from whatever government comes to power in the Congo on July 1.

How far are these doubts justified? How serious is the risk of a breakdown in law and order or of a short-sighted exploitation of foreign capital? These are political questions of vital concern to the mining interest far beyond the Congo, which we therefore make no apology for discussing here at some length in columns normally devoted to matters more exclusively of concern to mining.

Belgium's motives for granting independence to the Congo with such suddenness appear to be a complex of the recognition of the inevitability of having sooner or later to defer to African political aspirations, of the inertia of Belgian politics which appears inseparable from the religious and ethnic cross currents which bedevil the normal functioning of the political party system, and finally of a strong disinclination among the Belgian electorate to continue facing the mounting tax bill required for financing development in the Congo.

Whatever the motivation, however, there seems little doubt that once the decision to grant independence had been taken in principle, the Brussels Government has probably been more shrewd than is popularly supposed in granting it as fully and as rapidly as possible and accusations of panic may well prove to have been misplaced.

It must be remembered that although the African has always been given exceptional opportunities for economic advancement in the Congo, political rights have hitherto been non-existent for European and African alike. The secondary education of the Congolese has consequently been entirely focused on technical subjects, so that today administratively trained and politically experienced Africans are almost non-existent. In a country roughly the size of Europe there are, as yet, virtually no university graduates and less than one hundred Africans who have had any administrative experience up to even the equivalent of a British colonial district officer.

Thus, it cannot fail to be apparent to the handful of Africans upon whose shoulders responsibility of government will fall, not only that their political aspirations have met with a most generous response, but also that they and their countrymen are totally unequipped to cope unaided with self-government. Such aid is, however, ready to hand in the persons of the extremely large number of Belgians in the Congo civil service (there are about 3,000 in the Katanga province alone). These, in the majority of cases, are expected to remain at their posts after independence, not only out of loyalty but no less perhaps on economic grounds. Here the choice has largely been made for them by the Brussels Government which is guaranteeing their pension rights while at the same time offering negligible compensation for loss of office and the dubious alternative of re-entry into the Belgian civil service which is unlikely to have many attractive jobs to offer to colonial administrators who have long been highly paid by Brussels standards.

Thus, from the Belgian side, the stage is set for maximum assistance to the new state not only in terms of experienced advice at ministerial level, and of efficiency in administration but also in financial aid within the limits of Belgium's present level of commitment in the Congo. Beyond this the Congo's capacity for absorbing capital is obviously going to be tremendous and will have to depend on foreign aid programmes on a scale which a small country like Belgium cannot contemplate. In the negotiation of such loans, however, Belgian assistance can be invaluable.

In the face of all that Belgium is doing to meet Congolese aspirations for independence on a basis which promises well for its realization, what is likely to be the response of the Congolese themselves?

The experience of the recent Brussels round table conference is in part reassuring and in part inconclusive. On the credit side is the fact that the African politicians and the tribal chiefs, who came to the conference, showed themselves on the whole moderate in attitude and amenable to Belgian guidance and were also in the main quick to assimilate new ideas and new situations. Moreover there were indications that some of the considerable initial hostility which existed between them was dissipated in the process of sitting round a table together for three weeks.

On the debit side must be set the fact that although agreement was reached in broad principle the conference has really settled very little definitively, and indeed nothing really can be settled until after the provincial and national elections, due to take place in April on the basis of full adult male African suffrage. Thereafter the detailed drafting of the constitution will begin and may quite possibly not be completed before Independence Day on June 30 next.

The outcome of the elections is unpredictable and here the greatest hazard may well lie in the rapidity with which a democratic electoral procedure has been imposed on a politically totally uneducated and inexperienced electorate. The political guidance of the electorate will come from about 1 per cent of the population, in urban areas largely through the kind of demagoguism and political gangsterism familiar in emergent African states and in the bush through the influence of the tribal chiefs which remains paramount over most of the country.

If the Africans who attended the round table conference turn out in the main to be those who in fact come to power after the elections and if they maintain the moderate attitude which they exhibited in Brussels, the new régime has a very fair chance of getting off to a good start. In practice however, it is by no means certain either that they will be returned to power, or, that if they are, they will not in the process have committed themselves to much more extreme nationalism in order to fight off the challenge of the more irresponsible extremists among the African *évolués*, and in consequence may in the cause of "freedom" have committed themselves to dispensing with much of the help which Belgium is offering.

In all this there are two crucial factors. First, whatever Congolese government comes to power, maintenance of law and order will be a primary consideration if only because the continued existence of that government will depend upon it. Secondly, the new government will be critically dependent on tax gathering by the provinces.

Towards the maintenance of order, the new state will inherit the small but efficient and well-armed fighting force known as the Force Publique which is officered by Belgians down to the rank of senior N.C.O. The Africans in each unit are drawn from diverse tribes to avoid the build-up of tribal loyalties. It is also possible that the Belgian airborne troops based on Kamina will remain at the central government's disposal for an initial period. The police, however, are expected to come under provincial authority.

In urban areas these forces should be fully adequate, if used early and firmly enough. This week's disturbances in Elisabethville and other Katanga towns appear to have been promptly dealt with and there seems little doubt that the Leopoldville roits of last year could equally have been nipped in the bud but for the delay in policy instructions from Brussels.

If tribal warfare develops in the bush (and there is some fear of fighting between the Lulua and Baluba tribes in the Kasai) air transport may be the crucial factor in reaching the centre of the disturbance before it gets out of hand.

On financial matters the balance of influence should lie heavily with the Katanga in the post-election negotiations over the constitution. The Katanga at present supplies something like 60 per cent of the central government's revenue and receives back about 9 per cent. Three-quarters of the Katanga's contribution comes from the Union Minière. The Katanga would naturally like to see a higher proportion of taxes retained for provincial expenditure, but the financial situation of the present central government is extremely tight even under efficient Belgian administration and inevitably the expenses of government will rise rapidly with the appointment of African government officials who must for years remain dependent on European "advisers". However, although Katanga will have an equal voice with the other provinces in the Senate,

her representation in the Lower House will be only 16 members out of 137 (basis one per 100,000 population), and thus disproportionately very small in relation to her financial contribution.

Of critical importance therefore, will be the Katanga's part in the post-election negotiations regarding the degree of provincial autonomy and the proportion of provincial taxes which will find their way to the central exchequer. It would be wrong to suggest that opinion in the Katanga is as yet actively separatist, but it might well develop in this direction if the province was called upon to make too large a contribution to the central exchequer.

If the Katanga were ever to seek full autonomy, it could well remain economically self-sufficient provided that rail communication with Lobito Bay and Beira were uninterrupted. Whether, on the other hand, it could remain in political isolation would largely depend on the attitude of the other provinces and the extent to which these could maintain responsible government in the absence of Katanga's financial support. In the event of a breakdown of effective government north of the Katanga, the province might be forced to look South for protection.

In assessing the likely strength of the central government it is necessary to appreciate that the tribal chiefs as well as the various African political parties have so far taken a very provincial view of the new state and show little awareness of the Congo as a political entity. Of all the Congolese leaders at the Brussels Conference, Mr. Lumumba, the leader of the Congolese National Movement (C.N.M.) alone appears to have shown a grasp of the problems of national unity or indeed any strong aspirations towards national leadership.

In this latter respect his only challenger is Mr. Kasavubu, president of the Abako, the Lower Congo tribal association, and his interests appear to lie more in the direction of uniting with all the tribes in the Congo basin. Indeed, equally problematical in the longer run may be the attitude of the Leopoldville province to the central government. This is the centre of the extremist African *évolués* who have achieved a degree of semi-educated westernisation untypical of the rest of the country, and it is not inconceivable that the ethnically homogeneous tribes of the Lower Congo basin, including those of the newly independent République du Congo based on Brazzaville, as well as some of the tribes just across the Angola frontier, may discover a mutuality of interests.

The possibility of the eventual federation of four states of the former French Equatorial Africa (the republics of the Congo, the Gabon, Central Africa and Chad) may be relevant in this context, where the tremendous hydro-electric potential of the Inga could give the Leopoldville province a very strong bargaining position *vis-à-vis* these French states. Thus, all in all, it is not surprising that it was decided at the Brussels conference that the seat of national government should be Luluabourg instead of Leopoldville.

All this points to the provincial governments coming out of the post-election negotiations with a considerable degree of autonomy and certainly present indications are that the responsibility for exploiting agricultural, mineral and hydro-electric resources will devolve largely upon the provinces within the framework of fairly general central legislation.

The three main African political elements in the Katanga are the Balubakat, the Conakat and the tribal chiefs. The Balubakat is the party of the Balubas from Kasai, from whom traditionally the mining industry has drawn a major part of its labour force. It is also a supporter of Mr. Lumumba's nationalist C.N.M. It is, however, the Conakat party, which seems virtually certain to be the governing political influence in the Katanga and it was the fighting between the adherents of this party and of the Balubakat and C.N.M. which led to the imposition of martial law in and around Elisabethville this week.

The supporters of Conakat are indigenous to the Katanga and in their hostility to the "foreign" Balubas have the support of the local chiefs—notably the Paramount Chief of the Lunda whose influence extends into Northern Rhodesia and Angola. Conakat would appear to have the full, if unobtrusive, support of European interests in the Katanga but, politically, this may well prove to be a source of weakness as well as of strength. In practice, the primary European interest must be to see that stability is brought to whatever form the new regime may take, and it is in this context that the wholehearted support of the Katanga for the new regime may well be dependent on the success with which the central government maintains law and order and in particular manages to keep the peace in the Kasai.

Tribal antagonisms are very real in the Congo and the "electioneering" which is unavoidable between now and the elections in mid-April is liable at any time, as we have seen in the Katanga this week, to lead to virtual tribal warfare just as the celebration of independence itself seems certain to lead to many more broken bones.

However, in so far as the success of the new republic depends upon the maintenance of law and order, the prospects of success for the new regime are very fair provided that extremist nationalism does not deprive the country of Belgian aid. Certainly the significance of this week's fighting in the Katanga is less in the fact that it has happened than that it has been contained with apparent efficiency.

Whether the Katanga remains in the new republic or eventually seeks an independent status, there seems no reason to fear that the efficiency of its mining industry will in the long run be impaired or that this will become any less vital in the overall situation. Whoever is in control in the Katanga must work amicably with Union Minière if the mining industry is to remain healthy and productive. This is an elementary proposition that even the most extreme political demagogue must come to accept if he is to safeguard the revenue without which effective government becomes impossible.

MINING DEVELOPMENTS IN CHILE

Mitsubishi Shoji Kaisha, of Japan, has now formed a subsidiary Chilean company, Compañía Minera de Atacama, Ltda., to exploit its iron mines at Las Adrianitas, in Atacama province. Already work has started in the construction of a 54-kilometres road between the mine and the loading port of Calderilla, where mechanized loading facilities will be erected. The road will be eventually paved. The same company is building in Japan two ore-carrying boats, with 35,000 tons capacity each.

The annual production of Las Adrianitas is calculated at 300,000 to 500,000 tons. The ore will be carried to Calderilla on 60-ton trucks. It will be all shipped to Japan. The total investment in this project adds up to over U.S.$7,000,000. Of this amount, U.S.$1,575,000 correspond to the purchasing price paid for the mine, U.S.$1,114,000 to construction costs, U.S.$3,597,000 to machinery and equipment, and U.S.$873,000 to operating capital.

About 80 per cent of the machinery, trucks and other equipment required for operating the mine has already been imported, while the remainder is expected to arrive before April of this year. The Calderilla port is expected to be ready by the end of May. The first ore boat should arrive at Calderilla sometime in August, 1960.

The Caja de Crédito Minero, CACREMI, will invest this year E° 1,330,950 in modernizing its plants in the northern provinces of Tarapacá, Antofagasta, Atacama and Coquimbo. Of this, E° 215,000 will be spent on the E. de Bordos plant, E° 130,000 on the Illapel plant, E° 399,200 on the Osvaldo Martínez plant, E° 401,750 on the Pedro Aguirre Cerda plant and E° 175,000 on the Domeyko plant. E° 10,000 will be

spent on road construction and maintenance. The Escudo (E°) is worth about U.S.$0.95. The activities of CACREMI in advancing funds to small and medium miners, against future ore deliveries, will be continued at a high rate. Advances made during 1959 were almost triple those of 1958 (E° 832,000 against E° 308,000).

The Empresa Nacional de Fundiciones (National Smelters Co.) has announced plans to lend up to U.S.$2,500,000 to local mining companies, to enlarge their ore treating plants. Other specific projects that ENAF will carry out in the course of 1960 are the following: (a) Copiapó housing development, budgeted at E° 330,000 (b) studies and preparation of Teresita mine, with a budget of E° 206,000 (c) construction of Paipote floatation plant, with a cost of E° 751,350 (d) Construction of Paipote lixivation plant, with cost of E° 446,600 (e) mechanization of Caldera pier, budgeted at E° 258,500.

The Corporación de Fomento a la Producción (CORFO) has included in its budget E° 200,000 for making geological studies in Tarapacá province.

The studies to be effected include a survey of the Cordillera de la Costa, from Pisagua to the southern limit of the province. In order to avoid duplication, the survey made by ENAP (Empresa Nacional del Petróleo) will be used wherever possible.

Other work includes: (a) Survey of mining possibilities around Mamiña and Quebrada Tarapacá. (b) geological survey of the Andean region East of Arica. (c) preliminary mining survey of the region around Huatacondo.

All of this work, which will be financed by CORFO, has no relation to the United Nations Special Fund geological survey to be started this year.

BOLIDEN'S NEW LEAD MINE

A new lead mine, estimated to produce 150,000 tonnes of ore or 9,000 tonnes of pure lead annually, has just been opened up by the Boliden Mining Company at Vassbo, a village in the sparsely populated Idre district in the north-western part of central Sweden. It is an interesting enterprise in several respects, perhaps mainly on account of the new crushing method introduced but also because of the long history behind the discovery of the deposit.

A find of a stray piece of ore over 60 years ago indicated the presence of a lead deposit, but not until 1951 did the geologists succeed in localizing the body. It is situated about 18 km. (about 11 miles) from the place where the first ore piece was found. The body extends in an almost horizontal line 25 m. (80 ft.) below the surface of the soil and measures 2,000 by 100 by 6 m. In 1957 Boliden decided to work the deposit. Now there rises above the mine a pithead building 70 m. in height, three storage silos and the concentration plant, and the work in the galleries is in full swing.

Since the property is situated in a remote boggy tableland there is no direct communication by rail, and therefore the entire concentration process is handled at the mine. The crushing plant, situated at a depth of 80 m., is of a new design invented in the U.S. but hitherto never put into practical use. It utilizes the blocks of ore themselves plus water as crushing media, thereby saving high-grade expensive steel as used in conventional mills. After crushing, the ore — which has a lead content of 6 per cent — is concentrated by other modern methods and is conveyed by lorry to the nearest railway station in the form of granular ore containing 80 per cent of lead.

The investments for the new mine, which will employ about 100 hands, have amounted to close on Kr.20,000,000 (£1,380,000). The Vassbo mine will supply about a quarter of Sweden's requirements of lead, at present totalling 40,000 tonnes annually.

BRIGHTER PROSPECTS FOR PHILIPPINE MINING

The U.S. Bureau of Mines forecasts that Philippine production and export of metals will show a steady rise, due largely to expanding long-term demand by American and Japanese industry. The outlook is described as being especially good this year for U.S. consumption of Philippine chrome and copper; and good prospects are foreseen for Philippine shipments of iron ore, copper, zinc, and mercury to Japan, in view of the favourable industrial outlook in that country.

The Bureau of Mines is preparing to publish the most complete survey of Philippine metal production, consumption, and commerce ever made in Washington. There has been considerable interest in Washington in the possibility that the Philippines will gradually undertake processing of more of its metal output, particularly copper.

The situation in the Philippine gold mining industry is less favourable, due to the relationship between price and production costs. Output in recent years has been only one-half that in the maximum pre-war year. In 1958 and 1959 the country sold much of its gold production in the free market to obtain a price higher than the U.S. rate of $35 per ounce.

The Bureau estimates that, with the introduction of modernized mining methods in the zinc industry, Philippine exports of the metal should amount to a maximum of 5,000 tonnes in 1960 and 7,000 tonnes in 1961. In copper, the estimate is for 60,000 tonnes to be exported this year, and 65,000 during 1961. In the case of iron ore, maximum exports this year have been estimated at 1,500,000 tonnes and 2,000,000 next year.

Chrome exports are expected to total 620,000 tonnes in both 1960 and 1961, including 500,000 tonnes of refractory grade and 120,000 of metallurgical. Philippine exports of mercury are estimated at 4,000 flasks for this year, and 5,000 flasks for 1961.

COLLIERY DEVELOPMENT IN AUSTRALIA

A very important and commendable move in the coal mining industry is the proposed amalgamation of the two leaders in the New South Wales industry (other than Broken Hill Proprietary Co.) J. and A. Brown and Abermain Seaham Collieries, and Caledonian Collieries Ltd. The merged company will form one of the largest of its kind in Australia. The amalgamation will give more effective use of their resources and greater all-round efficiency. The new company will have far greater force in the industry than was possible from two independent companies. More efficient coal production can be planned, more efficient selling, and more effective cost reduction and control, which is very important in the face of competition by oil, and the advance of nuclear power.

The coal industry of the State has started 1960 very well, with increased consumption within the country, and expanded exports compared with the corresponding period of 1959. Mechanization has reached a stage at which 80 per cent of black coal is mined mechanically, in which continuous miners and shuttle cars are important units, and Australia is now second only to the United States in colliery mechanization. Output per man shift has risen from 4.6 tons to 5.15 tons in a year, or 12 per cent. Costs have been substantially reduced, but the recent increases in basic wage and margins, resulting in an increase of 16 per cent in weekly pay rates, are disturbing. The advance in mechanization, and erection of coal washing plants, an important factor in the economics of the industry, will continue throughout the year.

Amongst the youngest coal enterprises in the State are the Burragorang Valley mines, which are privately owned. They are highly mechanized, and being situated in rugged country, road transport to rail is essential. A subsidiary of Placer Development Ltd. has now taken over the project.

Thailand's Tin Mining Industry

LIKE her southern neighbour, the Federation of Malaya, Thailand can by no means be described as an underdeveloped country. Indeed, by Asian standards, Thailand enjoys a large measure of prosperity, and considerable economic progress has been achieved since the Second World War.

During the period 1952-57 the rate of growth in real output has averaged 5 per cent a year — well in excess of population growth — and Thai currency has been convertible.

Until recent years economic growth had been achieved in Thailand with very little intervention on the part of the Government, but the World Bank Mission, in its recent economic report on Thailand made it clear that the country's resources are no longer such that their potential can be realized in the natural course of events through unaided individual effort. Effective government assistance to supplement activity is becoming increasingly necessary. The government has accepted this necessity, stated the World Bank Mission.

Whilst Thailand's main exports — rice, rubber, tin and timber — are losing some of their force in the economic growth of the country, they still remain the backbone of the national economy. Thailand is the world's fifth largest tin producing country, and her tin exports rank in value only after rice and rubber.

Tin Mining Operations in Thailand

The history of tin mining in Thailand is similar to that of Malaya. It is believed that the Chinese were the first to mine tin in the country, and the Portuguese established a trading post at Bhuket in the southern area for dealing in tin as early as the sixteenth century.

Nowadays, over 90 per cent of all the tin produced in Thailand comes from placer deposits, and the main mining areas are in Peninsular Thailand in the south, and along the Burmese frontier in the north-west.

Thailand was the first country to employ the dredge for tin mining. In 1907, a continuous bucket dredge, then used for deepening harbour and river channels, was adapted for the recovery of tin at Bhuket by Tongkah Harbour Tin Dredging N.L. The Australian Tongkah Harbour Compound concern began similar operations in 1911 and the idea was soon adopted for tin mining in Malaya.

Today about half the tin produced in Thailand comes from dredging operations, and about one third is recovered by gravel pumping and hydraulicking. Dulang washing contributes as much as 9.5 per cent which, compared with the use of this method of recovery in Malaya, is high. There is also a small production from lode mining.

An interesting aspect of tin mining in Thailand is the working of off-shore deposits, a fairly recent development which is now being considerably expanded. Tongkah Harbour Tin Dredging Ltd., the company which first employed the continuous bucket dredge for working inland deposits, was also the first company to start working the sea bed off the west coast of Thailand at Bhuket.

The company is now building a deeper digging dredge to work the remaining reserves in this area and to operate in other sea areas owned by the company in this vicinity.

Aokam Tin Limited, an Anglo-Thai company formed in Malaya in 1954 with a 33 per cent Thai participation, is also working off-shore in this area, using a grab dredge built from a converted oil tanker for recovering deposits between Bhuket Island and the mainland.

A clamshell dragline mounted on a pontoon is used by the Tromal Company for operating under the sea in the Bhuket Bay, and another Anglo-Thai company is reported to be planning off-shore mining by grab dredge in this area.

The working of off-shore deposits is already making an important contribution to the country's tin output.

Production of tin in Thailand prior to Export Control was about 12,000 to 13,000 long tons a year. Immediately before the Second World War the total was approximately 15,000 tons a year, and in 1940 it rose to a peak of 17,116 tons. The 1957 production of 13,531 tons was the highest total since the last war.

Prospecting Limited

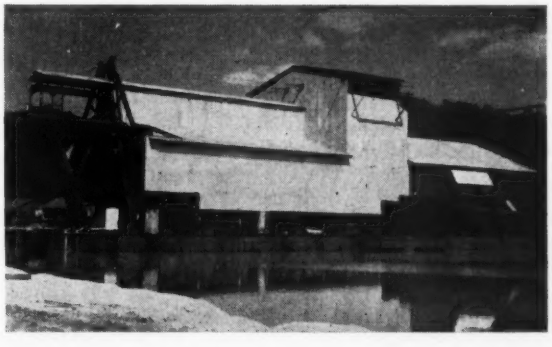
It has been estimated that tin ore reserves in Thailand total as much as 1,000,000 tons, which would represent over 100 years of mining at the present rate of output, but little prospecting is being carried out at the present time as a result of heavy royalties, serious lack of internal transport — and government restrictions.

The World Bank Mission, in its consideration of tin mining whilst making its economic study of Thailand found that : " For many years the government has reserved for itself all prospecting and mining rights north of the 10th parallel of latitude. Hence, mining activity over the greater part of the country is directly controlled by the Department of Mines, and the foreign companies established in the south, where they have invested much capital, are unable to extend their operations.

" Like many other government departments," adds the World Bank Mission, " the Department of Mines does not have enough qualified staff to do properly everything it tries to do, viz., operate mines, carry out prospecting at the rate needed, administer the mining laws, and follow through with the geological survey, which is far from complete.

" The last should be the department's most important function. In any event, we recommend, that the restriction on private mining north of the 10 degree line should be removed, and that private companies and prospectors should be encouraged to operate all over the country."

This article is reproduced by courtesy of the international monthly magazine *Tin* and has been abridged. **Illustration shows the Bangnon dredge of the Siamese Tin Syndicate Ltd. at Renong**



It is significant that many tin deposits are being worked out, and little effort is being made to explore the many virgin deposits in the less accessible parts of the country which could make use of the dredges now completing work in present areas. The number of dredges in Thailand is decreasing, and some have been sold by their previous foreign owners to Chinese or Thai operators who, with lower overhead and other costs, are better able to work poor deposits at a profit.

There is, however, some indication that the Thai Government may soon take action on the lines recommended by the World Bank Mission. In an interview given at the end of last year the Thailand Minister of Industry is reported to have said that he was changing his country's long-standing policy of reserving mineral resources until such time as the Thais might be able to exploit them for themselves. In future he would allow foreign exploration and exploitation of Thailand's mineral resources.

There remains, of course, the possibility that, even if exploration of these deposits is thrown open for foreign companies, the government may ask to be taken into partnership in any such ventures, as it did in the case of Aokam Tin Limited now operating the grab dredge off-shore at Bhuket.

Changes in taxation have taken place in the last few weeks, and whilst the situation is not yet entirely clear, it still appears that foreign companies will in future be paying substantially 25 per cent on their profits plus a further 15 per cent when these profits are remitted. As most foreign companies will of course wish to remit all their profits, the substantive taxation which they will have to bear from now on is at an effective rate of around 36¼ per cent.

It must be pointed out, however, that this is no less than the Malayan producers have to bear and less than those of Nigeria, and in addition the Thais have introduced a system of "tax holidays" for new enterprises on the Australian/Canadian pattern. Similarly, as regards royalty, the Malayan and Nigerian rates are, at the present tin price, at least as high as those of Thailand. The Exchange Control regulation that Malayan dollars received in respect of tin ore sales must be returned to Bangkok and converted to baht is still in force and this causes endless delays and complications.

Reporting on Thailand's potential for economic development, the World Bank Mission stated that tin production in Thailand is at present handicapped by unfavourable market conditions and by approaching exhaustion of the more accessible alluvial deposits.

It took the view, however, that there is every reason to believe that off-shore and inland deposits are still ample to sustain production and in the longer run to increase it as the market situation permits.

Tin is still the only mineral resource of commercial value in Thailand, and even if, as a result of much needed exploration and surveying, other mineral resources are found, tin will still remain an important source of revenue for the country.

To enable the industry to make its full contribution to the economic development now being planned for this growing nation, it is essential that increased facilities should be made available to mining interests, both domestic and foreign, for more intensive prospecting in all parts of the country.

Some relief from taxation must also be granted if finance is to be found for opening up new mining areas and new capital is to be attracted for long term development.

Foreign investors are still being somewhat cautious in their attitude towards Thailand.

Mining in Pakistan—III

OTHER MINERAL PRODUCTION OF PAKISTAN

By C. HARVEY RICHARDS, A.C.S.M., M.I.M.M.

SALT is produced from two sources, namely rock salt mines and by the evaporation of sea water. In Pakistan, the production and distribution of salt is in the hands of the Excise Department, as before Partition.

Mines are situated in the old Punjab. Operations are in hand at three points, Khewra, Warcha, and Kalabagh. The first two are mines in the Salt Range which extends for over 100 miles between the Indus river and the Jhelum river. The third is on the west bank of the Indus at Kalabagh. Their relative importance is shown by their average production, namely, 500, 120 and 50 tons per day. Salt is to be found in many places along the Salt Range and for centuries was mined at scattered points. During the third quarter of the last century the Government of India caused the workers to concentrate at Khewra and Warcha, with a limited amount of work at Kalabagh. In carrying out this concentration of effort, the miners were guaranteed perpetual rights to be employed in the mining of the salt. Their descendants still work at Khewra and Warcha. The Government of Pakistan have confirmed the ancient rights, and subsidise the wages when production falls off.

The Khewra mines were worked by the Mongols, and later by the Sikhs, and it is claimed that the existence of salt there was mentioned by Alexander the Great. The Salt Range escarpment was the line of march of Alexander's troops, and the battle which caused him to turn back (328 B.C.) was fought near the present city of Jhelum, at the eastern end of the range.

Khewra mine is well laid out and has electric haulage underground. The system of mining is room and pillar with chambers 100 ft. long, 50 ft. wide and over 100 ft. high. The pillars are of the same size as the chambers. During the last war production rose to 2,000 tons per day. Present production is restricted by demand. Since Partition, markets in Bharat, as the other part of the sub-continent is called, have been lost although a small tonnage still is exported there. Afghanistan takes most of the export from Khewra now. The salt so mined is mainly of a pinkish tinge, and assays over 98.5 per cent sodium chloride. Sometimes patches of white salt are found, but the country people who buy the salt prefer the pink. This is perhaps a wise thing to do as pure white gypsum is found in the area, and the white salt could be adulterated with it.

The reserves of rock salt are immense. At Khewra owing to the mining system used, there remains as much salt in pillars as has been extracted and development work is well in hand. Some of the salt beds are from 20 to 120 ft. thick. They have a very flat dip. At Khariala some 14 miles from Khewra, a drillhole for oil went through 4,000 ft. of salt.

Salt from Kalabagh supplies the local market, and production depends on the demand. The operation is small, and transport of salt to surface is by donkey back. When chambers are being cut underhand, inclined tracks for the donkeys are cut in the salt on the sides of the chambers.

Sea Water Salt

Salt is produced at the coast, from sea water by solar methods. For some time after Partition, East Pakistan was supplied with the sea-salt from around Karachi, but recently East Pakistan has been able to produce its own sea-salt. Exports from Karachi have, however, increased from 5,665 tons in 1955 to 93,381 tons in 1956, principally to Japan. More recent figures are not available.

Limestone and Gypsum

Large deposits of both limestone and gypsum occur in West Pakistan. Mining is by quarrying ; the product is used mainly in the cement industry and some gypsum is used in the P.I.D.C. fertilizer factory at Doudkhel, near Kalabagh. Deposits of these minerals occur near each other in many areas along the flanks of the Indus valley. East Pakistan, unfortunately, has no limestone deposits. The average yearly production of limestone is between 800,000 and 1,000,000 tons, and that of gypsum is about 40,000. These production figures tend to rise each year as cement manufacture rises.

Other Minerals

Lead : Lead has been reported in the Chagai District and in Swat. In Chagai there is lead showing in a fault crush zone on the top of a mountain. This showing is only exposed for about 30 ft. The fault zone can be traced for several thousand yards across the country, but no other showing of lead has been seen so far. A syndicate has recently started investigating the area, but is handicapped by lack of equipment.

In the Ushu area of Swat a small number of very narrow veins have been seen in diorite. They vary from two inches to 11 inches in width, and range over the sides of a valley between 10,700 ft. and 11,700 ft. in altitude. There are seven stringers of which only one is over 15 ft. in length, and that one has been traced for 150 ft. The area is covered by snow for six to eight months in the year, and is unlikely to become a producer of lead.

Beryl : Beryl has been reported as present in the Hazara District, and the G.S.P. has some nice specimens in its collection. No deposit of commercial size has yet been found, but the government geologists are aware of the importance of this mineral and any find is likely to be checked by them very quickly. The newspapers report finds of beryl and other minerals, from time to time but do not check the accuracy of the reports before publishing.

Bauxite : Deposits are reported in the Campbellpor area and Azad Kashmir. No detailed survey has been carried out in either area, but the Campbellpor area is to be investigated in the near future by the Geological Survey of Pakistan in conjunction with geologists from U.N.T.A.B. A few selected samples have been taken and these show a high silica content.

Kyanite : This mineral has been reported in existence in Swat but no details are available.

Emeralds : These were found recently in Swat State, and are being exploited in a small way. Production figures are not yet available.

Vermiculite : This mineral has been reported in the Western Ras Koh Range to the south of Dalbandin railway station. The area is practically inaccessible owing to large stretches of sand, and absence of any regular track. A preliminary geological survey in 1957 reported enthusiastically on the area, but the estimates of many million tons of low grade vermiculite were not based on any pitting, trenching or other detailed probing. The area has recently been leased to a commercial undertaking, but work has not yet started.

Manganese : Manganese occurs in the Las Bela area to the north west of Karachi. An estimated tonnage of 500,000 of 35 per cent Mn. has not been confirmed during recent check studies. Manganese has also been reported in Hazara, but is of such low grade that it is unlikely to be of commercial importance.

Marble : Marble deposits are to be found in the North West Frontier Area. Some are inaccessible, others can be reached. One of the latter is known as the Mullagori deposit. It exists in the area controlled by the Mullagori tribe and overlooks the Kabul river about 7 miles upstream from the Warsak Dam site. It is 17 miles by poor road, through Tribal Territory, from the road from Warsak to the southern end of the Khyber Pass. There is no question regarding the reserves at this spot, since the marble forms a large spur of a mountain range and is roughly 10,000 yards by 5,000 yards in area. It rises from the river to some 800 ft. above it. Work in the past has been in the form of sporadic pickings along the length of the spur, but to no depth below 50 ft. Consequently, the unweathered zone has not been penetrated. The stone is mined at present by sand blasting large boulders, and the broken pieces are then taken to Peshawar to be broken down to chips. These are used to give a mosaic finish to concrete floors, etc. Should the demand warrant it there is plenty of material available in this one spot.

To the west of Quetta, and to the north of Nok Kundi, there are deposits of onyx marble. This is quarried and sent to Karachi in blocks of approximately one ton. Some of it is shipped to Italy for the manufacture of table ornaments. The rest is cut and polished in Karachi. Owing to the present restricted market the throughput from this deposit is small.

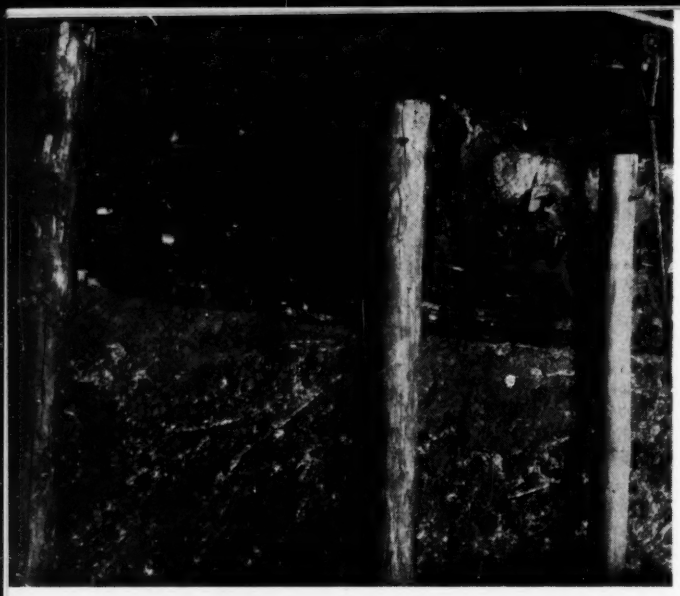
Other minerals are on record as occurring in Pakistan. Some of these prove to be records of specimens having been seen by itinerant District Officers in the last century. Others are reported by tribesmen, who refuse to reveal the whereabouts of the occurrence, pleading fear of being killed by rival tribesmen. In some cases high grade samples have been picked from low grade deposits. All this means that much remains to be done by way of eliminating the doubtful deposits. This is an expensive proposition, and can hardly be done by Pakistan resources, and the necessary reserves of trained engineers and geologists do not exist. It will be a long term programme of proving, and must rely on outside aid and manpower. Some of the problems now being considered under the U.N.T.A.B. are iron and bauxite deposits. It is the obvious method.

General

It will be noticed that in dealing with mining, East Pakistan is not mentioned. This is due to the fact that part of the country is mainly covered by alluvium. Gas has been found in the Sylhet Hill tracts, and peat is known to exist in large quantities, in the Ganges delta area. The largest deposits are reported to lie 8 ft. under water. Recently in drilling for oil at Bogra in East Pakistan, good quality coal was found at between 8,000 and 9,000 ft. Good limestone was found in the same hole at about 4,000 ft. Of course, coal at this depth is not a mining proposition, and steps are planned to see whether the same formations can be picked up elsewhere in East Pakistan, at a shallower horizon.

The recently formed Bureau of Mineral Resources is responsible for formulating these exploratory programmes. The Bureau includes the Geological Survey of Pakistan, as well as the old Petroleum and Mineral Concessions section of the Coal Commissioner's Department. Areas of West Pakistan which will require more thorough study include the tribal areas which ring the country to the west and north. Snow in winter and floods in summer make this a difficult problem to tackle.

PNEUMATIC STOW



THE system most commonly used for filling mined cavities is known as " Pneumatic Stowing ". In this system the crushed rock is carried along a pipeline by a current of compressed air and discharged at high velocity into the space to be packed, the consequent bombardment ensuring a very high density of the packed material.

One of the many advantages of the pneumatic stowing system is that a pipeline can be carried almost anywhere round bends and up and down gradients with little difficulty, thus enabling a very flexible system of filling to be readily achieved. Another advantage is that the density of the pack which is achieved by the very high velocity of ejection at the pipe end is higher than can be obtained by any other comparable method.

Pneumatic stowing was first applied on a large scale in Germany in the 1930's and the developments that have followed its introduction have shown a divergence between the Continental manufacturers and their British counterparts. Generally, Continental engineers have favoured the use of high pressure compressed air to do the work of carrying heavy material along pipelines and throwing it into the packhole.

In Great Britain, however, development has followed different lines involving the use of comparatively low pressure compressed air with the object of simplifying the equipment and reducing both its capital and running costs. Pneumatic stowing has become fairly commonplace in coal mines in various parts of the world and an explanation of its method of operation and the advantages to be gained from its use will not be out of place here.

Pneumatic stowing was first used on any considerable scale in the packing of the waste in the longwall system of coal mining. It was also applied to the sealing off of bord and pillar workings and to the extraction of very thick coal seams by a series of lifts. In well organised collieries, up to 400/500 tons of suitable material can be packed on to a coal face in a single shift. Pneumatically stowed packing is much tighter than that which can be accomplished by hand work, therefore the support of the roof is much more effective and the movement of strata can be controlled. The high density of packing reduces the surface subsidence and can eliminate the grave risk of fire present in certain coal seams. Again, where large quantities of gas are given off by the strata, the solid stowing of coal faces reduces the accumulation of gas and improves ventilation. A valuable by-product following its introduction is that it provides a means for disposing of all the waste rock underground near where it is made.

The Main Problems

The equipment comprises a stowing machine for introducing crushed stone into a pipeline which is taken along roadways and round bends up to the space which has to be packed. A current of compressed air flowing along the pipeline carries the material and ejects it at high velocity into the pack. Suitable preparation of the stone is necessary and provision of compressed air in fairly high volume must be taken into account. These two requirements provide the most important considerations associated with the introduction of the system to any mine. Indeed, for several years the two requirements of the provision of stone preparation plant and also large quantities of compressed air meant that only very well organised and planned installations having outputs of the order of 300/400 tons of material per shift could prove more economic than other means of packing stone into cavities. On the other hand the considerations and advantages mentioned previously merited its use in many cases.

The development work undertaken by Markham's has been directed toward the solution of these two main difficulties. On the one hand to reduce the cost of compressed air required for the system and on the other to the development of machinery designed to eliminate the need to prepare stone by expensive crushers, screens, etc.

The most successful development in savi g air cost has been in the use of the Low Pressure Stowing System. The term " Low Pressure Stowing " signifies the use of stowing equipments which can operate at pressures below 20 lbs. p.s.i. and quite often less than 10 lbs. p.s.i. Pressures of this order allow the use of very simple types of compressors which can be installed underground near to the place where the air has to be used. Since these compressors normally work at about 10 lbs. p.s.i. they are more usually known as blowers, they weigh about 3 tons complete with motor and are transportable pieces of equipment which can be moved about the mine as readily as the stowing machine itself.

These blowers are built on the Roots supercharger principle.

Above, top left, side of roadway driven through a previously stowed district. Alongside, at left, stowed pack in a 62 ft. seam

STOWING IN MINING

As a result of 15 years of development work conducted by Markham & Co. Ltd. a wide range of equipment is now available for filling cavities and stowing wastes

Blowers of this type have been at work in mines for stowing purposes for several years and have proved themselves economic, safe and pitworthy. Designed for the roughest of conditions they are usually located not more than about 5 yds. from the stowing equipment.

For small outputs, or where the space to be stowed is accessible and the pipeline can be kept short and straight, only one blower will be required to operate a stowing machine. For larger outputs or very long lengths of pipe two blowers are used in series. Since these blowers operate at low pressures where the consequent temperature of compression is low, water cooling is not generally necessary, but for pressures above about 10 lbs. p.s.i. a new form of cooling has been adopted. This has been a most interesting development since less than one gallon of water per minute is required and the resulting cooling effect has proved most effective and practicable. The only requirement is the supply of a small hose connection to the blower itself. Many blowers of this type are operating pneumatic stowing machines, many of them using less than 100 h.p. The maximum horsepower used has not exceeded 200 on the larger installations.

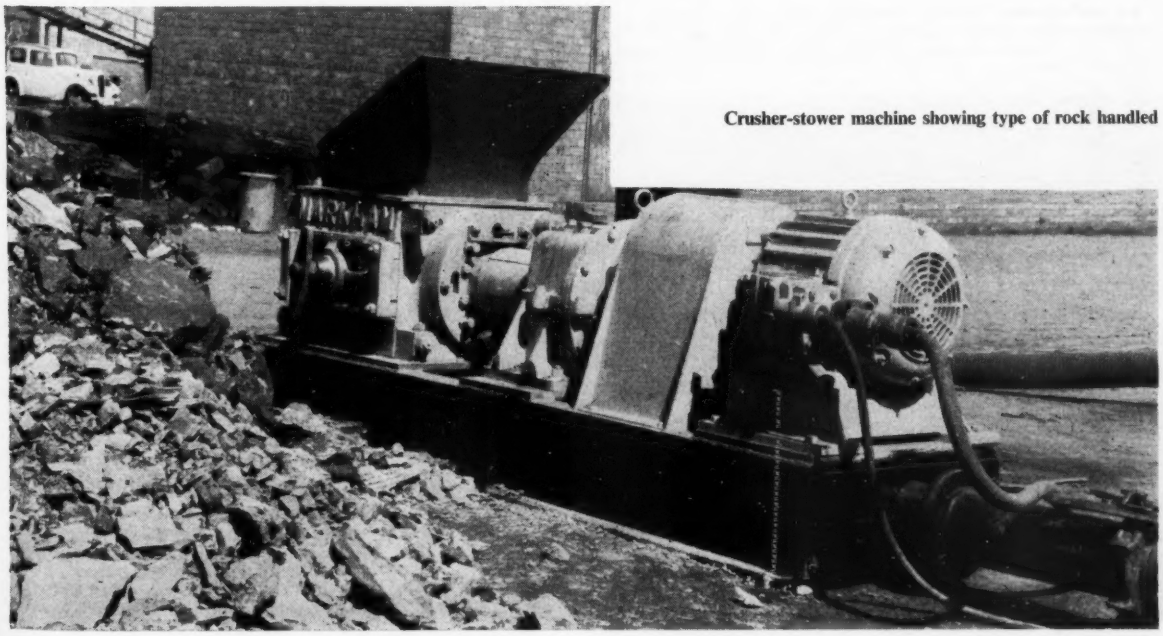
To achieve the best utilization of the low pressured air supplied by these blowers, stowing machines have been designed to give the most efficient operation under the varying conditions found in mining, and several types are now available. The combination of low pressure stowing machinery in conjunction with low pressure blowers has proved a very significant achievement. One particular type of low pressure stowing machine has been developed for the express purpose of catering for the need to dispose of relatively small quantities of stone and is described below.

Small Tonnage Requirements

For many years the pneumatic stowing system was not applied unless fairly large quantities of material could be handled, as otherwise the cost of the stone preparation plant proved prohibitive. Yet the fact remained that in many operations in mining 50/100 tons of waste stone were produced and had to be disposed of either packed on to coal faces or used for filling stopes or roof falls and all these operations were costly in manpower, in fact owing to the cost of hand packing much stone has been sent out of the mine which would have been better used to fill cavities or to make packs.

A new type of stowing machine has been designed to overcome this particular difficulty. Its first application was for handling ripping stone and heading debris in coal mining, this material being used for putting on roadside packs, filling cavities and old roadways, etc. This machine has been used in coal mining for several years and is known as crusher stower equipment. It is now commonly used for the handling of front and back rippings, scouring debris, heading stone, etc. and the disposal and packing of it either in old roadways, cavities or in gateside packs to help support the roof, protect the roadway and prevent air leakage.

Crusher stower equipment in its simplest form needs no stone preparation plant and can be operated by a single blower to stow through pipelines up to 150 yds. long. (Longer pipelines can be negotiated by the use of two blowers or high pressure air.) It is capable of packing stone to a vertical height of about 70 ft. The crusher stower machine crushes suitable stone to a size capable of passing through the stowing pipeline, it requires a fairly good fragmentation of the stone fed to it, and very hard rocks may need to be treated by a simple form of primary breaker which can be supplied with the equipment. Maximum outputs of the order of 150 tons per shift can be achieved with this equipment under the best conditions although many requirements are limited to about 50 tons in a single shift, the maximum stone available.



Crusher-stower machine showing type of rock handled

Machinery and Equipment

Role of Haulage in Combined Mine Scheme

One of the National Coal Board's most important streamlining projects, the Hawthorn Combined Mine Scheme, is now almost complete. This scheme has been concerned with linking and stepping up the production of the three Durham pits, Elemore, Eppleton, and Murton, and concentrating their output on one new shaft at Hawthorn where fifty new coke ovens and a coal processing plant which can deal with 750 tons of coal per hr. have been installed. To achieve this economically desirable arrangement many miles of new roads have been driven underground.

An outstanding feature of the Hawthorn scheme is the drastic improvements made to underground coal haulage systems. Thirty-eight underground mining locos will soon be hard at work and 31 of these will be of the battery-powered type. Hawthorn will then employ more battery-powered locomotives than any other mine in England.

Underground traffic will be speeded up by means of a unique signalling system designed by the Signal and Colliery Engineering Division of the Westinghouse Brake and Signal Co. Ltd. Twenty-six of the 31 battery locomotives are of English Electric manufacture and 15 of these use 94-cell Crompton Parkinson traction batteries. Each of these batteries weighs about 5 tons.

During a normal shift the 64 h.p. battery locos will travel approximately 350 useful ton-miles, hauling mixed loads of just over 50 tons distributed between about thirty 2-ton mine cars. Average speed of the locos is 9 m.p.h., but speeds of up to 15 m.p.h. can be obtained. The gradients of the new roads, designed to be in favour of the load, range from 1 in 200 to 1 in 25.

All of the Crompton Parkinson batteries at Hawthorn are divided into four sections; each section being contained in a sheet steel container, the four sections are bolted on to a sub-frame to make up the complete battery. This arrangement allows a section to be removed from the battery and taken to the surface where repairs can be carried out in the No. 2 Area centralized battery repair shop. At Hawthorn, the battery case is fitted with four rollers designed to roll on strips placed across the loco frame. When a battery charge is due (normally after every eight-hour shift) the loco is driven between two banks of charging racks. The discharged battery is then linked to its charged replacement and, as one is rolled off, the other rolls on. So far, this system has proved to be entirely successful.

Nine battery charging stations are installed at Hawthorn below ground, three on the upper level at 1,070 ft. below sea level and six on the lower level at 1,365 ft. below sea level.

SHAFT WINDING PLANS IN SOUTH AFRICA

According to our correspondent in South Africa, it appears as if West Driefontein's No. 4 shaft area is going to be opened up in a big way. Towards achieving this end one of the largest sets of winding equipment in the world is on order.

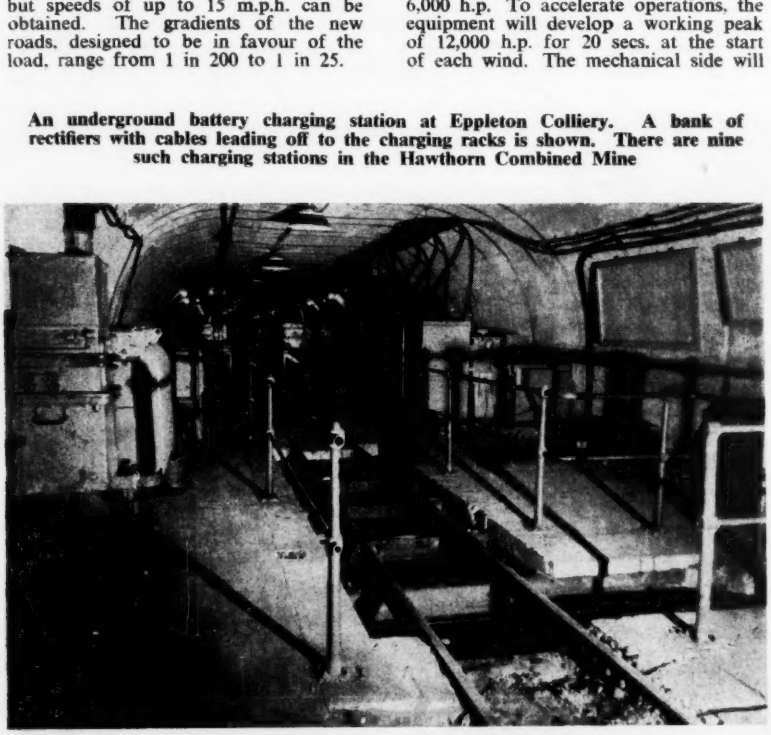
The electrical side consists of a mercury-arc converter fed winder to be made by English Electric with a rated 6,000 h.p. To accelerate operations, the equipment will develop a working peak of 12,000 h.p. for 20 secs. at the start of each wind. The mechanical side will be capable of hauling a 20,000 lb. payload from 6,000 ft., the designed output being 277 tons an hour. Winder drums will be 16 ft. in dia. and 6ft. wide.

A duplicate of this equipment is on order for Doornfontein G.M., so that it can be assumed that it will not be long before this mine's third shaft system gets underway to serve the western and deeper southern portion of the property.

This year is certainly going to see an epidemic of shaft-sinking on the gold mines. A recent round up of hoisting equipment either being installed or on order produced a total of more than 20, ranging from the "babies" of around 1,000 h.p. for men and service hoists to the English Electric "giants".

An interesting aspect of hoist design is the development by Mr. R. H. Blair, consulting mechanical engineer to Anglo American, of Blair Stage Hoist fame, of a multi-rope friction winder which it is claimed has all the advantages of the Koepe system and none of its disadvantages. One of the big advantages is that the Blair hoist can be used for sinking with the minimum of modification. One of these is going in at President Steyn this year, and its performance will be watched with the closest interest by the whole industry.

An underground battery charging station at Eppleton Colliery. A bank of rectifiers with cables leading off to the charging racks is shown. There are nine such charging stations in the Hawthorn Combined Mine



DRIVE UNIT FOR UNDERGROUND CONVEYORS

With the increasing use of belt conveyors to transport both mineral and men, it is often desirable to have provision to drive the conveyor at various speeds. This is very easily achieved when air motors are used, but as most conveyors are driven by squirrel cage induction motors, speed control is usually effected by suitably designed gear units. There are disadvantages of shift gears: decrease of speed increases output torque and with many designs speed change cannot be made during operation of the conveyor.

In an endeavour to combine the economy of electrical drive and easy speed control Demag have developed their ABV gear drive. This consists essentially of normal planetary gearing but having the sun pinion and the planet carrier driven by individual controlled electrical motors. These may be operated separately or simultaneously. With both motors operating in the same direction, their contribution to the speed on the output shaft is cumulative. With the pinion motor switched for rotation in the opposite direction to the planet carrier motor, the speed of the output shaft is proportionately diminished. Thus a range of four operating speeds is available and a great advantage of the arrangement is that speed variation is achieved by steps. Starting currents are considerably reduced by this division of motor output and, in consequence, it is seldom necessary to use a fluid coupling.

The range of speeds possible is a function of the individual motor outputs. If, for example, the output of the two motors is in the ratio 1 : 3 and the transmission ratio is selected accord-

ingly, stopping one or other of the motors will give speeds 3 or 1 depending on whether the smaller or the larger motor is switched off. If both motors are switched to run in the same direction speed 4 is achieved and if in opposition, speed 2 is given. Thus with constant torque on the output shaft the speed variation is 1.2.3.4.

It is, of course, possible to use two identical driving motors in which case only two speeds are possible. Other designs of simple two-speed conveyors have been widely used in the past, but the advantage of a continuous four-speed drive such as outlined makes this system applicable to a wider range of operating conditions.

A ROTARY DISCHARGE VALVE

A rotary discharge valve designed to provide continuous and free discharge of dust or fine powders from hoppers or bin outlets has been produced in a very compact form. The valve is manufactured by Dunford and Elliott Process Engineering Ltd.

This valve consists of a horizontal body with 8-in. sq. inlet and outlet flanges between which a 9-in. dia. four-bladed rotor revolves on a longitudinal axis. The rotor is fully shrouded and a positive seal is obtained between it and the housing by means of renewable hard felt seals recessed into the main body casting. Complete gas and dust tightness is ensured by the stainless steel or neoprene rubber adjustable sealing and wearing strips which are fitted to the tips of the rotor blades.

The space saving feature of its design is the mounting of the reduction gearbox to form one end cover of the valve body a construction which eliminates the use of couplings or chain drives. The rotor is carried on the drive shaft of the gear unit, the drive being transmitted through a shear pin to prevent damage to the gearbox or to the motor in the event of overloading or jamming of the rotor.

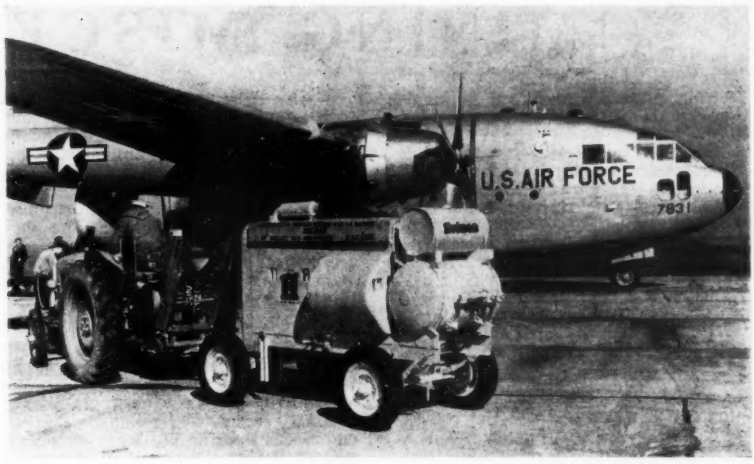
The unit is powered by a ½ b.h.p. totally enclosed fan-cooled, continuously rated squirrel cage motor which, driving through a rugged triple reduction gearbox, provides a rotor speed of 12 r.p.m.

The rotary discharge valve is manufactured in cast iron or stainless steel and is available in two sizes: as a single type unit having a capacity of 100 cu. f.h.p., or as a duplex type unit with double this capacity.

2,500-TON SEA DREDGE

A 2,500-ton sea dredge, claimed to be the only one of its kind in the world, is destined for service at Phuket island, Thailand. Reconstructed from an old land dredge, it will be used by the Tongkah Harbour Tin Dredging Co. on its various properties.

The dredge can be moved between properties, and during the monsoon period it can operate in inland leases. It is powered by German diesel engines, and its dredging capacity is between 250,000 and 300,000 cu. yds. of tin-bearing soil a month. The dredge has a bucket ladder of 140 ft. long, capable of digging to a depth of 100 ft. Preparatory work was done on this dredge in Malaya at the mouth of the Juru river.



Ten Holman road breakers and a Holman 160 c.f.m. diesel driven portable air compressor have been given to the Moroccan Government by Holman Bros. of Camborne, to help clear ruined Agadir. All machines were supplied with the necessary ancillary equipment and a technician from the Holman agents in Casablanca went to the earthquake stricken area to supervise the operation of this equipment, which is shown being loaded into a U.S. Air Force freighter at Culdrose

Equipment Digest

Kalgoorlie Southern Gold Mines N.L., is planning to use a drilling outfit, designated F150, in its search for a repetition of the Kalgoorlie gold field at depth. Apart from the power unit, the outfit, believed to be the largest diamond drill in the world, was completely designed and manufactured by Mindrill Ltd. in Victoria.

The drill incorporates many unique features and is capable of drilling either vertical or angle holes to depths in excess of 10,000 ft. Initially it will be used for drilling BX size (2¼ in. dia.) holes. The drilling rig will operate in conjunction with an inclinable frame carrying a head sheave 72 ft. from the base. This will permit hoisting 60 ft. lengths of rods, reducing to a minimum down time during hoisting and lowering rods.

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Exploration in the Carol Lake-Wabush Lake area, United States, has demonstrated that the gravimetric method of geophysical prospecting is capable of locating magnetic and non-magnetic iron bodies in drift covered sections and that it allows estimates of ore volumes with fair accuracy once rock densities are known.

These comments were made recently by R. D. Macdonald, chief geologist, Labrador Mining and Exploration Co., Ltd., in a paper before the Mining and Exploration Division of the Society of Mining Engineers of A.I.M.E.

★

A $32,400 research grant to study the role of stress waves in breaking up rocks has been awarded to Colorado School of Mines by the U.S. National Science Foundation. The project is aimed at creating a better understanding of factors which control the breaking up of rocks. Studies will then determine behaviour of rocks when struck sharp blows and their behaviour under explosive pressures.

★

Allegheny Ludlum Steel Corp. has announced plans to build what is described as the world's largest vacuum-melting furnace at its Watervliet Works in New York State. In making the announcement, Mr. C. W. King, executive vice-president, said the furnace will produce ingots up to 50 in. diameter and at least twice the weight of any vacuum melted ingots now being produced commercially.

The largest vacuum-melted steel ingots available today weigh less than 20,000 lb. and the new furnace will be able to produce ingots twice that size With some modification of auxiliary facilities, ingots more than three times as large as those now available could be produced. The new furnace, of the consumable electrode vacuum melting type, will not only make larger forgings and plates available to builders of new aircraft, missiles and rockets, but should also lead to expanded civilian markets for vacuum-melted materials.

The new furnace will be built by Lectromelt division of McGraw-Edison Co. It will bring to eleven the number of consumable electrode furnaces in commerical production at Allegheny Ludlum.

The consumable electrode vacuum-melting process consists of, first, making cylindrical electrodes of a specified alloy composition in a conventional electric furnace, then remelting these electrodes under vacuum by means of an electric arc, and recasting the vacuum-melted metal in a water-cooled copper crucible. The vacuum serves the dual purpose of keeping contaminating elements out and also drawing off undesired gases as the molten metal drips into the copper crucible.

MINING MISCELLANY

A zinc and lead furnace is to be installed at Rhodesia Broken Hill Development Co. in Northern Rhodesia. The contract includes the engineering, procurement and construction of the whole of the plant within the furnace area covering foundations, plant and equipment. The order is to be carried out by two members of the Power-Gas Group, namely Ashmore Benson Pease and Co., Africa (Pty) of Johannesburg and P.G. Engineering of Stockton on Tees. The contract is valued at over £1,000,000.

★

A total of $50,000,000 is to be spent on a new zinc mining project in the Lake Mattagami area of Quebec. The project will be carried out by Mattagami Mines, and will be financed by Noranda, McIntyre Porcupine and Canadian Exploration. To assist developments, the government is constructing a road this summer at a cost of $4,000,000 from a point 35 miles north of Amos and extending 110 miles to the mine site. The company will participate financially in the construction of this road. The envisaged mine plant will handle a daily stint of 2,000 tons. Ore will be drawn from property discovered in 1957, the deposit containing 25,000,000 tons of zinc, copper, silver and gold. It is expected that zinc will account for roughly 25 per cent of the deposit. Underground development and the construction of the ore concentrating plant are expected to cost $25,000,000 and the refining plant $30,000,000.

★

The revival of the Reefton district in the West Coast of New Zealand's South Island as a rich gold producer is expected to be a step nearer with the arrival in the Inangahua district of representatives of the Canadian-financed mining company South Pacific Mines, now operating in worked-over gold claims in the Thames and Waihi areas in the North Island. It is believed in the Inangahua area that the concern is linked with the Redondo Exploration Co., which has pegged out 12 areas behind Reefton. These claims embrace a goldrich area once worked by the Globe, Wealth of Nations, Keep it Dark, Energetic and Perseverance quartz mines, which made a big contribution to the £26,000,000 worth of gold Inangahua yielded up to 1950. The company has made it known that its operations will be extended to the South Island. The locality was not named but it is believed that the Inangahua region figures prominently in its plans.

★

Japan's coal production last year reached only about 47,300,000 tons, according to the Japanese Coal Producers' Association. Output in 1958 was 49,700,000 tons. The stated reasons for the decreased ouput are the cuts in production imposed by the government since the voluntary cutbacks of the producing companies had proved to be insufficient, the strike of mineworkers during the year which accounted for the loss of 3,400,000 tons, and the closing of 150 pits owing to recessionary tendencies. Stocks of coal fell over the year from 11,100,000 tons to 9,600,000 tons, while consumption rose from 45,800,000 tons to 48,600,000 tons. Imports remained virtually unchanged at the 1958 level of approximately 4,500,000 tons.

A plan to increase potash production of the Dead Sea Works at Sodom from 112,000 to about 1,000,000 tons annually has been drawn up by the Construction Aggregates Corporation of Chicago. The President of Construction Aggregates has said that the plan includes the building of dams in the Dead Sea. The plan, however, still awaits the decision and acceptance by the American company's management and the Israel Ministry of Development.

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The General Ilmenite Co. has entrusted the Boyer-Dragon-Stem Organisation with a contract for the complete equipment for the mechanical processing, handling, storage and shiploading installations for ilmenite ore from Abu-Ghusum (Red Sea). The installations are designed to process 700 tons an hour and load freighters at the rate of 250 tons an hour.

★

Two-thirds of the European residential region of Nkana mine township, Northern Rhodesia, will be incorporated into Kitwe Municipality, subject to government approval. The area in question covers 3,000 acres and includes 11,014 houses, sewage works, government schools, and a police camp. The houses remain the property of the Rhokana Corporation. All lighting, power and roads, water and sewage reticulation will be handed over free of charge.

★

In 1959 Sweden exported a total of 15,461,000 tonnes of iron ore compared with 14,810,000 tonnes in 1958. Production of iron ore rose 2 per cent. to 18,300,000 tonnes, this being accompanied by a rise in stocks from 2,800,000 tonnes to 3,500,000 tonnes.

★

Laurite has been identified in Sierra Leone. It was first discovered in platinum concentrates from the Guma Valley, and has now been observed in chromite concentrates collected from near Senduma in the Kenema district.

★

Four districts of Madhya Pradesh are planned to be covered this year under the scheme sponsored by the Geological Survey of India to make the layman mineral-minded and to train non-technical people in the search for minerals. A few districts in each of the States have been chosen to launch the schemes, and geologists are making extensive tours of them indicating the means of indentifying the more common minerals.

★

A group of Soviet engineers is visiting India to present plans for the development of new coalfield in Korba. The project envisages an output of 4,000,000 tons a year, and the scheme suggests the erection of the Manikpur strip mine coal washing plant, two pits and electrometalurgical shops. Korba will supply coal to railways and to the new power station providing for the Bhilai steel mill. Through its credits granted to India, the U.S.S.R. would help in construction of the coal mines and would supply the necessary mining machinery.

Last year 7,506,096 tons of coal were mined in the four mines of the Netherlands State Mines, over 45,000 tons less than in 1958. Daily output per manshift underground totalled 3,786 lb. of coal as against 3,540 lb. in the previous year. The State Mines accounted for 62.7 per cent of the total net coal production of all Dutch mines (11,978,190 tons).

★

According to a statement issued by the Bank of London and South America, Venezuela last year exported some 16,800,000 tonnes of iron ore. This total is higher by 7 per cent. than that recorded in 1958. Of the total exports, some 13,100,000 tonnes were sold to the United States.

★

Under a technical aid agreement signed in Conakry last week between the Government of Guinea and the Soviet Union and covering the coming three years, geological exploration is to be carried out in Guinea with the use of Russian equipment.

★

In Southern Rhodesia, Messina (Rhodesia) Development Co. has been granted an exclusive prospecting order for all previous metals and base minerals over 460 sq. miles until the end of 1964, during which period £125,000 must be spent on operations in the reservation. Rio Tinto (S.R.) Ltd. must spend £7,500 in the search for precious metals in the next two years in more than 10 sq. miles of the Hartley mining district; and Tateguru Copper (Pvt.) Ltd. is to spend £18,000 on operations during the next two years in 48 sq. miles in the exclusive prospecting for base minerals. Governmental permission has also been granted for a detailed survey of about one sq. mile in the area of the Khami Dam Bulawayo, to discover if copper deposits there are worth developing.

★

India is to supply iron ore and other items to Czechoslovakia under the terms of a trade agreement drawn up between the two countries. In return she will receive machine plant and tools. Bulgaria will supply India with pit locomotives and other goods under a similar trade pact.

★

At Chibuluma West, Northern Rhodesia, shafts are being sunk in the £600,000 project for the development of some 2,000,000 tons of copper ore in the region containing 4.74 per cent copper and 0.05 per cent cobalt. It was recently reported that a rocksurface shaft had already been sunk more than 200 ft., and a ventilation shaft about 125 ft. This expansion is expected to be completed in 3 years time and, utilizing surplus plant capacity, should increase the Chibuluma mine's copper production by about 4,000 l. tons a year.

★

A total of 14,000,000 Eastmarks (official rate of exchange 6.22 to £) have been spent on the recently opened research institute which forms part of the mining academy at Freiberg, in East Germany. Studies are being carried out at the institute into a range of subjects, primarily connected with ore concentration and mineral processing.

Metals and Minerals

Nickel's Record Year

Nickel enjoyed its finest year in 1959, states the annual report of International Nickel. Total deliveries by Free World producers reached an estimated 257,500 s.tons, compared with the previous peak of 244,500 s.tons in 1957. Free World consumption of nickel in 1959 was at an all-time zenith of approximately 210,000 s.tons. This compares with 160,000 s.tons in 1958 and with the previous record of 207,500 s.tons in 1957.

For the first time Inco delivered more than 150,000 s.tons of nickel in a single year, the exact figure being 158,520 s.tons. This compares with 102,900 s.tons in 1958 and with the previous record of 145,230 s.tons in 1955.

Restoration of consumer confidence in the future of nickel supply was largely achieved during the year. Demand in the U.S. grew progressively stronger, except for the disturbances caused by the prolonged strike in the steel industry. The adverse effect of the strike on nickel consumption was minimized to a large degree by marked gains in the U.K. and other European markets.

Inco's new nickel mining project at Thompson, Manitoba, which will add 37,500 s.tons of nickel per year to the company's production capacity, was brought closer to completion. Preparatory mining, milling and smelting operations have been scheduled for the second half of 1960 and refining operations for early 1961.

In 1961 the nickel production capacity of Free World producers outside of Cuba will exceed the anticipated nickel consumption for that year. As for the present year, the U.S. Government has stocks of surplus nickel, stated to be in excess of strategic requirements, more than sufficient to offset any curtailment of supplies from Cuban production in 1960. An adequate supply position is thus assured.

In the U.K. a new technique was developed at the Clydach refinery which will permit a substantial increase in the output of nickel pellets.

The company is most actively continuing its programmes for market development and research on new and expanded uses of nickel. If the present high level of industrial activity continues, the outlook for 1960 is for continued capacity production.

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Freeport Sulphur, parent company of the Moa Bay Mining Co. in Cuba, has denied reports that the Cuban Government had taken preliminary steps to seize the nickel and cobalt plant at Moa Bay. In fact, the Cuban Minister of Agriculture, who has jurisdiction over mining, has stated in a television address that the government had no intention of intervening in the Moa Bay situation. Discussions between the government and the company are still in progress.

CADMIUM PRICE INCREASE

On Wednesday the U.K. delivered price for cadmium was raised by 6d. to 10s. 6d. per lb. A similar price increase occurred on December 21 last. Prices had been higher on the Continent recently and this week's U.K. increase is no doubt in recognition of this and of the recent better consumption figures which for the U.K. amounted to 1,257.2 tons in 1959 compared with 1,024.25 tons in 1958.

FLUORSPAR ENQUIRY RULING

In a report to the Senate Finance Committee at Washington, the Tariff Commission rejected making any change in present tariffs, or the placing of quotas on U.S. imports of fluorspar from Mexico, Spain, Italy and West Germany. One section of the Commission's report declared that the domestic fluorspar mining industry had expanded to meet Federal buying for the stockpile, which ended in 1958. The industry, it was stated, was at present "in a condition of transition to normal production and trade." Concerning acid grade fluorspar, the report stated that, if import restrictions were tightened, the captive mines in the U.S. would produce more and this would not help the independent fluorspar producers. The same view applied to the raising of restrictions on imports of metallurgical grade fluorspar. The Senate request for the fluorspar investigation was spurred by independent producers. The Office of Civil and Defence Mobilization in September, 1959, rejected a plea from the domestic fluorspar industry for import production.

It remains to be seen how the Commission will vote on the second ruling, on lead and zinc imports, which is scheduled to be presented to the Finance Committee no later than March 31.

QUIET MANGANESE MARKETS

Conditions in the manganese ore markets remain uneventful, and it is reported that supplies of lower grade ore are more than adequate, though high-grade material is not over-plentiful. Demand for marginal requirements additional to those already covered under long-term contracts continues to be unimpressive. The Indian government is reported to be showing less inclination to grant price discounts on ore in barter deals, but it remains to be seen what impact this is likely to have on future price levels.

It is understood that, apart from a few details, the U.S./Indian barter deal, involving ferro-manganese and grain, has been virtually finalized. It is believed that some 185,000 s.tons of ferro will eventually move to the U.S., although over what period of time is apparently not yet settled. India's share of the business will be some 112,000 s.tons. The nominal price of the material is $205 c.i.f.

Exports of manganese ore from the major ports of India—Calcutta, Bombay and Madras — during 1959 rose to 648,020 tons from 565,760 tons in 1958. Earnings from this source were lower, however, at Rs.79,400,000 compared with Rs.90,100,000 in 1958. The U.S. was still the leading buyer.

AUSTRALIAN BERYL RESTRICTIONS EASED

The Australian Atomic Energy Commission has been purchasing and stockpiling all Australian production of beryl, but recently announced that it was unable to purchase any more beryl pending a review of government policy. In order that producers might not be placed in a difficult position, exports of beryl under the Customs (Prohibited Exports) Regulations will be limited to approved destinations on an interim basis, pending a review of government policy which will be made shortly.

INDIAN CUSTOMS DUTIES

India's new taxation proposals, announced on February 29, include the following import duties: 200 rupees per tonne on tin plate and tin sheets; 10 rupees per ton on pig iron, other than pig iron used in the manufacture of steel; 500 rupees per tonne on aluminium sheets and circles, and 300 rupees per tonne on aluminium ingot.

U.S. BUYS MORE RHODESIAN CHROME

Southern Rhodesia replaced Turkey as the United States' biggest supplier of chrome, capturing 50.1 per cent of the market, according to the 1959 report of the Director of Mines, Mr. W. Ralston. The report also stated that the base mineral reserves of Southern Rhodesia continued to attract the interest of the large exploration companies of South Africa and other countries, including Japan. Copper, nickel and iron ore deposits appeared to be the centres of interest.

★

Negotiations are under way regarding the sale of 150,000 tons of Turkish chrome ore to the U.S., according to an announcement by the Etibank.

It is further reported from Istanbul that enquiries involving the supply of substantial quantities of chrome ore are being received from the U.S. Interest, however, is reported to be centred mainly on high-grade (46/48 per cent) ore.

FREE PLATINUM MARKETS

The undertone of the free platinum market in London is reported to be looking rather more asured. Slightly more enquiry has been noted, but so far buyers have shown little inclination to accept sellers' price ideas, with the result that turnover has remained very small with prices quotably unchanged. The market in free supplies of palladium is also very quiet.

In New York dealers on the outside

market are still able to make fairly sizeable offerings as low as $80.50 per troy oz., though primary sellers still adhere to their officially published asking levels of $82.00/$85.00. The rise in consumption and demand has so far failed to materialize.

WOLFRAM PRICES DRIFTING

In the absence of buying interest wolfram ore shipment prices in London continue to drift lower, quotations currently ranging from 148s. to 152s. Since the downward movement started a few days ago, prices have lost some 9s. to 10s. Although further easing would occasion no surprise, it is problematical how much further prices will fall before buyers are tempted back into the market. A level of about 140s. to 145s. has been suggested in some quarters.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The week has been featureless but with a better undertone developing in all markets except in that for copper which showed no reaction to reports of political unrest in the Belgian Congo.

COPPER EASIER

Copper prices in London have tended to decline owing to the general weakening of the price structure in the U.S. The backwardation has remained fairly constant in spite of a further slight reduction in stocks in official warehouses, which at the end of last week amounted to only 2,897 tons, a reduction of 175 tons when compared with the previous week. Demand continues at a satisfactory rate but there are signs that consumers in the U.K. and Europe are waiting for weak days to place their orders. The Belgian price has been reduced from the equivalent of 31¼ c. per lb. to approximately 31.10 c. per lb., Antwerp or New York.

In the U.S. the expected reduction in the customs smelter price to 33 c. per lb. has now taken place, but business at the new level is reported as slow, and dealer copper is already being offered at a small discount. At the same time the intake price for scrap has been reduced by another 1 c. per lb. to 23¼ c. per lb. which values 3 months' electro at well below the 30 c. mark. It appears that consumer demand is slack enough for it to be met largely by the main producers who are well sold through April, but customs smelters are probably accumulating stocks and a further reduction in their price cannot be ruled out.

The current meeting of the International Wrought Non-Ferrous Metals Council is taking place in Rhodesia where the delegates will be entertained by the Copper Companies, and shown round the Copperbelt before proceeding to the Belgion Congo. It is expected that the question of some kind of so-called fixed price for copper will be discussed but it is believed that no concrete proposals are likely to emerge.

TIN UNDER CONTROL

The tin market has been firm against a background of good consumer demand and less offering of metal by the buffer stock manager. It now appears that the increase in the next quarter's quota was made under article 7 of the agreement, which permits an increase when a producing member cannot meet its quota for the current period; it was subsequently announced that Bolivia was the country concerned.

The output of tin concentrates in that country has been reduced by almost a third over the last two months owing to bad weather and labour disputes, and there is likely to be a substantial short-shipment against both the current quarter's total of 6,984 tons and next quarter's total of 7,275 tons. In some quarters it is believed that Indonesia may also find difficulty in filling its quotas.

Figures issued by the International Tin Council show that during 1959 the output of tin in concentrates amounted to 138,000 tons as compared with 134,000 tons in 1958 and 180,000 tons in 1957. The smelter output for the same three years was 132,000 tons, 141,000 tons and 175,000 tons. The estimated consumptions figures are 164,000 tons, 148,000 tons, and 155,000 tons. All figures exclude the U.S.S.R. but include estimates in respect of China and Eastern European countries.

It is apparent from these statistics that the International Tin Council has now got the situation well in hand and that provided there are no major upsets the price of tin should be maintained between £780 and £800 without difficulty and it is believed that such a range is acceptable to both producers and consumers. At the same time it is hoped that the market will be left free between these limits so as to enable those engaged in the merchanting of the metal to obtain an adequate margin.

After last week's issue of *The Mining Journal* had been printed it was announced that the warehouse stock figure had been wrongly compiled and that instead of a large increase there had, in fact, been a small reduction and this trend continued with this week's figure at 7,998 tons.

On Thursday the Eastern price was equivalent to £799 per ton c.i.f. Europe.

LEAD AND ZINC MORE FIRMLY BASED

The firmer tone in the lead market has continued and although small arrivals of foreign lead in the U.K. are reported, consumers are still anxious buyers of any reasonably priced parcels. On the Continent there appears to be a small tonnage of cheap metal available but it is of an insufficient size to have any lasting effect on the price structure. In the U.S. demand has tailed off a little but the 12 c. per lb. price seems firmly established.

The zinc market is now very steady at the lower level reached after the announcement of the removal of restrictions and the re-establishment of a backwardation shows that nearby metal is still in short supply. On the Continent and in the U.S. demand is maintained and the price structure is unaltered.

LEAD-ZINC STATISTICS

The O.E.E.C. statistics for Western Europe show that the lead production in January was 59,932 tonnes, which was slightly lower than the December figure and about 6 per cent higher than twelve months before. Lead stocks held by producers were estimated at 50,768 tonnes and as this is the first time this figure has been reported there are no comparative figures available. For the whole of 1959 production showed an increase of 2 per cent over the previous year at 675,541 tonnes.

The zinc output for January totalled 76,327 tonnes which was slightly higher than the December figure and 7 per cent more than twelve months previous. Stocks at the end of January totalled 53,789 tonnes. During 1959 the total production reached 878,280 tonnes which was 3 per cent more than in 1958. The U.S. Bureau of Mines issued statistics showing that mine production in the U.S. was the lowest for 60 years and 5 per cent below the 1958 output and at the same time, refined lead production fell 27 per cent below the 1958 level largely owing to labour trouble during the second half of the year.

Producers' stocks reached a peak at the end of February 1959, but from then on fell during the rest of the year and with an increase in consumption of 10 per cent, total stocks in producers' and consumers' hands fell by about 22 per cent during the year. The zinc picture showed that 1959 mine output in the U.S., although slightly above the 1958 figure, was still the second lowest mine production since 1933. The smelter output was about 4 per cent above the 1958 level and consumption increased by almost 8 per cent.

Closing prices are as follows:

	March 10		March 17	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£253	£253¼	£250	£251
Three months ..	£238	£238½	£235¼	£236
Settlement ..	£253½		£251	
Week's turnover	10,425 tons		10,750 tons	
LEAD				
Current ½ month	£76	£76¼	£76¼	£76½
Three months ..	£75	£75¼	£75¼	£75½
Week's turnover	6,550 tons		5,700 tons	
TIN				
Cash	£785½	£786½	£791	£791½
Three months ..	£785	£786	£790	£790½
Settlement ..	£786½		£791½	
Week's turnover	850 tons		795 tons	
ZINC				
Current ½ month	£88⅛	£88⅜	£89½	£89⅝
Three months ..	£87⅞	£87⅞	£88	£88¼
Week's turnover	5,425 tons		5,275 tons	

London Metal and Ore Prices appear on inside back cover.

Mining Finance

Inco's Best-Ever Year

The International Nickel Company of Canada during 1959 passed a milestone by delivering more than 300,000,000 lb., for the first time in its history. In their statement to shareholders, Chairman John H. Thompson and President Henry S. Wingate describe the change in the situation since 1958 as " one of the sharpest and swiftest recoveries in demand for nickel in the history of the industry ".

The rise in Inco's earnings to $85,157,000, equivalent to $5.83 per share, compared with the equivalent of $2.71 in 1958 and $5.90 two years ago, was attributable not only to the recovery in nickel consumption, but also to an improvement in sales of Inco's other products. Copper deliveries rose from 210,570,000 lb. to 252,450,000 lb., cobalt from 2,170,000 lb. to 2,400,000 lb., and metals of the platinum group from 145,400 oz. to 384,600 oz.

Meanwhile, Inco is pressing ahead with the preparations for production at the new Thompson Mine in Manitoba. This vast new development will add some 75,000,000 lb. per annum to Inco's productive capacity. Preparatory mining, milling and smelting operations have been scheduled for the second half of 1960, and refining operations are planned to begin in early 1961. The refinery will utilize a new process developed by Inco's research staff, based on the direct electro-refining of nickel sulphide.

As to the current year, the chairman and president say that deliveries during the last part of 1959 and the early months of 1960 have been extraordinarily high—at a rate exceeding Inco's production, in fact. This, of course, is partly a reflection of increasing industrial activity throughout the world, and partly the result of inventory-building by consumers against the possibility of a decline in supplies from Cuba.

This could present a serious problem, were it not for the United States Government's willingness to part with its stockpile at a rate exceeding any likely curtailment. In the longer term, the marketing of the Manitoba production in 1961 will bring the total capacity of free world producers above the projected consumption for that year. Further ahead still, the prospect of maintaining free supplies of nickel must, failing the discovery of major new occurrences, depend on the course of events in Cuba. Even so, whatever these may be, Cuba in the long run must sell its metal somewhere, so that it would seem that for practical purposes the user is in an era in which he can design nickel into new products with confidence that the metal will be available.

MARY KATHLEEN IN 1959

The 1959 annual report of Mary Kathleen, Rio Tinto's Australian uranium producer, maintains the high standard of production achieved by its predecessors. Indeed, the first-class presentation of the report mirrors the achievement of the company in bringing the mine to production 27 months after the first construction workers arrived at the site—nine months ahead of schedule. Perhaps even more remarkable is the fact that capital expenditure has kept very close to the original estimates—no mean achievement in Australia's highly inflationary climate.

Mary Kathleen's profit for the year totalled £3,723,886 before deducting a £1,756,000 transfer to reserve. From this, dividends totalling 2s. 9d. were paid, leaving £1,815,245 to be carried forward. Since the end of the year, a further dividend of 1s. has been paid, and an indication given that in future, dividends will be considered quarterly.

On the technical side, 1959 witnessed the decision to instal an electronic sorter, said to be the first of its kind in the Southern hemisphere. This should eliminate up to 20 per cent of waste from the mill feed. In addition, the size of the main crusher is being increased. When both of these developments are fully operational in April, costs should be perceptibly reduced. A reduction has already been achieved by the introduction of new types of explosives, and Mary Kathleen must now fall well within the category of low-cost uranium producers.

This should be of great value to the company when its government contract ends in 1965. At present, indicated and stockpiled ore is sufficient to keep the mill operating for ten years, while possible ore represents a further two years' supply. In addition, new development is constantly indicating new U_3O_8 at a rate little short of mill output. Obviously, therefore, this company has no doubts about its ability to compete in the buyers' market of 1965-70, when the oversupply will be at its worst.

NO OIL-FROM-COAL PLANT FOR RHODESIA

The Wankie Colliery Co. has announced that after exhaustive investigations spread over more than 2½ years it has come to the conclusion that the establishment of an oil-from-coal industry in Rhodesia is not at present economically practicable.

Two schemes were considered. The company first examined the Lubimbi coalfield which contains large reserves of medium-to-low-grade coal which is eminently suitable for gas synthesis. This, however, was rejected as unsound because it would have entailed a costly construction programme including the establishment of a new coal mine.

Attention was therefore given to the possibility of drawing supplies of coal from Wankie and the siting of the plant at either Livingstone or Bulawayo.

The investigations on this scheme were also discouraging as, although the capital requirements were lower than those for the Lubimbi scheme, the interest and redemption of the capital were still heavy and the total cost of production left no margin for distribution costs or any profit.

RAPID PROGRESS AT INCO'S MANITOBA NICKEL PROJECT

The rapid progress that has been made in the development of the International Nickel Company of Canada's properties in Manitoba into the world's second largest source of nickel supply is evident in the aerial view of a section of the Thompson Mine plant site area. In right centre, in an advanced state of construction is steelwork for the concentrator. Rising to the right of the concentrator is the head-frame for the mine's 2,100-ft. production shaft and behind it are three fine-ore bins. Towering over the smelter construction in the left background is a 500-ft. chimney, one of the tallest landmarks in western Canada. Winding through the wooded area is the Burntwood River, on the banks of which three miles from the plant site is being built the town of Thompson where the mine's 2,000 employees and their families will live in one of Canada's most modern communities.

DIFFICULTIES AT VIERFONTEIN

A fall of hanging at Vierfontein Colliery, a coal producer under the Anglo American aegis, has resulted in all men being withdrawn from the East Shaft section of the mine pending a full underground examination. It is not expected that output will be affected, since surplus productive capacity exists in the West shaft area.

It is believed that the ground movements which precipitated the fall will be confined to a well-defined area, and that it will prove possible to resume work in a major portion of the East section. It may, however, prove necessary to provide additional access to the section through a new incline shaft

SAINTS PAY WELL

With a distribution of 2s. 3d. per share, St. Helena provided the first really bright spot in the spring O.F.S. dividend season. The latest dividend is 6d. above last autumn's payment, 1s. more than the corresponding payment last year, and more than double the 1s. 1d. paid in September 1958.

Whether this rate of increase can be maintained is another matter. Although capital expenditure is relatively lower than at most of the O.F.S. mines, shaft-sinking and other projects are still absorbing more than 33 per cent of Saints' income, while tax may become payable towards the end of next year. Eventually, dividends of 7s. should be comfortably possible, but the rate of increase may well not be so rapid henceforward as in the past.

NEW DEEP BOREHOLE AT HARTIES

Probably as a result of the recent phenomenal value of 15,317 in.-dwt. intersected in borehole HB23, the Hartebeest engineers have drilled two new deflections in borehole HB24, situated in the deep area some 9,000 feet south of HB24. Values intersected — 239 in.-dwt. and 275 in.-dwt. — however, do little to advance the knowledge of this area, which is of such vital importance to Harties' long-term future.

RHODESIAN DIVIDENDS

As had been expected, last week's interim dividends from Rhokana Corporation and Rhodesian Anglo American showed sharp increases compared with the corresponding payments last year. Rhokana declared an interim of 1s. 6d. net of Rhodesian tax, which, after allowing for the intervening nine-for-one scrip issue, is double last year's payment. Rhoanglo's declaration is of 2s., compared with 1s. 3d. this time last year.

Released simultaneously with the Rhokana and Rhoanglo dividend news were the preliminary profit figures of Rhodesian Broken Hill. As far as the earnings figures are concerned the announcement must be considered satisfactory, with the net operating profit coming out at £885,918 after tax, compared with £590,739 in 1958. In view of the rising tide of capital spending however, it is not surprising that the directors have been unable to do more than recommend an unchanged final dividend of 6d. per share, making a net total of 9d. for the year.

MOSHER MAKES GOOD

Last year, control of the closed-down Consolidated Mosher gold mine passed from Ventures to MacLeod-Cockshutt Gold Mines, a member of the $29,000,000 Little Long Lac group. The expansionary impetus in this group was then at its peak, and almost the first action taken by the new management was to dewater the shaft to below the 2,040-foot level. Hydro-electric power was reconnected to the shaft site, and a tunnel on Macleod-Cockshutt eleventh level was pushed over the common boundary to connect with workings on Mosher's 1740 level for ventilation and other services.

The most important work, however, began in May of last year, when drilling began in a campaign to delineate the limits of the lower portion of the orebody which continues from MacLeod into Mosher. It is on this portion of the orebody that the long-term future of Mosher depends, although earlier work on the upper levels has developed or indicated over 4,000,000 tons of ore averaging more than 3 dwt. Eventually, ore reserves should total 12,000,000 tons or more, assuming that the body persists in width and value as it dips to a depth of around 2,750 feet in the western portion of the property.

In addition to bringing the main property to the production stage as quickly as possible, Mosher is busy investigating prospects in the Manitouwadge and Long Lac areas. Nothing has yet come of this work, but it does provide an interesting speculative seasoning to the share.

Present plans are for Mosher to distribute at least two-thirds of its income once assets have been built up. All in all, the prospects for Mosher appear extremely promising.

Coming Events

A course of three lectures is to be delivered by Prof. R. Schuhmann, professor of metallurgical engineering at Purdue University, United States, at the Imperial College of Science and Technology (Metallurgy Lecture Theatre), Prince Consort Road on April 26 and 27, 1960. Syllabus is : Tuesday, April 26, at 11.15 a.m., The Role of the Engineering Sciences in Engineering Education. Tuesday, April 26, at 3.30 p.m., Metallurgy, Materials Sciences and Engineering; Wednesday, April 27, at 3.30 p.m., The Anatomy of Extractive Metallurgy.

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The American Zinc Institute will hold its 42nd annual meeting in St. Louis, Missouri, April 7 and 8, when representatives of the zinc industry will report on marketing problems and consumption trends. The first session will be held jointly with the Lead Industries Association and the Galvanizers Committee, and the meeting is also to learn details of the expanded research programme sponsored jointly by the American Zinc Institute and the Lead Industries Association.

LONDON MARKET HIGHLIGHTS

By last weekend the South African gold share market had suffered one of its worst weeks for many a year. Virtually every share price in the list had fallen and losses in the better-known issues had ranged up to as much as £1, and by Friday evening there was still not the slightest sign of a recovery.

The weakness stemmed from persistent Continental selling. These sellers have been shaken by the recent turn of events in the Belgian Congo and appear for the time being to have lost faith in investment in any other part of Africa. Comparatively little stock was offered in London and Johannesburg, but few cared to buy in the circumstances and there was thus nothing to stop the headlong plunge in share prices.

The Continental selling started up again on Monday and matters were made worse by news that following the recent disaster at Coalbrook North, operations were also to be suspended at the South colliery. This meant that all mines in the Klerksdorp, West Rand and Orange Free State would be faced by a 20 per cent electric power cut.

But on Tuesday, Continental selling petered out. Cape buyers, scenting a long-awaited rally, quickly returned and prices recovered with the same speed as they had fallen. Free State Geduld and Western Holdings, for instance, both rebounded to 152s. 6d. from a low point of 140s. West Driefontein regained 5s. to 172s. 6d. and in the Finance section Anglo American were 3/16 better at 9¼. Clydesdale Collieries, owners of Coalbrook, rallied to 6s. on the later news that Coalbrook South was to be reopened.

The re-opening of Coalbrook South followed an appeal by the owners against the decision of the Inspector of Mines. There remains a possibility that this decision will yet be rescinded, in which case the western gold mines would again be faced with the possibility of a power cut. However, it is believed that coal could be moved from the Witbank coalfield to the power stations serving these mines at about 14 days' notice. It would be surprising if the industry has not taken the necessary steps as a precaution.

In Diamonds De Beers Consolidated became a happier market at 176s. 3d. after having been only 168s. 1½d.

The recovery movement was taken further on Wednesday, a feature being the demand from Johannesburg institutional investors. Free State Geduld and Western Holdings each rose to 155s. West Driefontein returned to 178s. 9d. and Anglo American improved to 9½.

The earlier weakness had also spilled over into a copper share market which was already being troubled by the setback on Wall Street. But Coppers later rallied with the rest. After the steady decline, Chartered improved to 95s. 9d. in front of the annual meeting. Also better were Rhokana (61s. 10½d.) and Rhodesian Anglo American (80s. 7½d.) ; the sharply increased interim dividends had previously made no impact on prices during the prevailing depression. Tanganyika Concessions recovered partly to 36s. 6d.; they had been severely hit earlier, falling to 34s. in line with other shares having interests in the Belgian Congo.

One of the few sections to refuse to succumb to the earlier downtrend was the Tin group. Mainspring of a steadily growing revival of investment support was provided by the International Tin Council's disclosure that the stage has been reached where certain of the producing members of the Tin Agreement cannot for the moment fulfil permitted export quotas. Bolivian production has fallen sharply and with world consumption having almost caught up with current production the earnings outlook for Malayan mines must be better than ever. Singapore was quick to realise this and buyers there lifted Tronoh 2s. 6d. to 30s. 9d. Local investors preferred Tanjong which moved up to 24s. 3d. among many lesser gains.

THE MESSINA (TRANSVAAL) DEVELOPMENT COMPANY LIMITED

(Incorporated in the Union of South Africa)

A DECADE OF RAPID EXPANSION

TOTAL ASSETS NOW EXCEED £13,000,000

CAPITALIZATION AND SCRIP ISSUE PROPOSALS

COPPER MARKET DOMINATED BY STRIKES IN 1959

COMMANDER H. F. P. GRENFELL ON NEAR AND LONG-TERM PROSPECTS

The Tenth Annual General Meeting of Stockholders of The Messina (Transvaal) Development Company, Limited, was held on March 16 in Johannesburg, **Commander H. F. P. Grenfell, D.S.C., R.N. (Ret'd.)** presiding.

The Chairman addressed the Meeting as follows :—

Ladies and Gentlemen, it gives me great pleasure to welcome you once again to the Annual General Meeting of your Company, and on behalf of the Board of Directors to present for your approval their Report and the Audited Accounts for the financial year ended September 30, 1959.

I propose — with your approval — to take these as read. (Agreed.)

Conditions in the Copper Market

Before giving you my usual review of the year's operations, it may be of value if I recapitulate for you what has happened in the copper market since our last meeting, as it is mainly in that context that you should consider our results.

Viewing the past twelve months in retrospect it is apparent that from beginning to end the copper market was entirely dominated by strikes. During the first half of the year consumers had to evaluate the threat of a possible shutdown in June of nearly the whole of the mining and refining industry in the United States, and in the second half they had to cope with the effects of this stoppage which actually began in August and has only just ended.

The market situation was further complicated in July by the announcement of cuts in production by two large producers, the view being held at that time that production was running well ahead of consumption, and that perhaps, after all, there would be no major crisis in the industry.

In the event, however, the U.S. Steel industry was paralysed by a strike which began on July 15 and lasted until the beginning of January this year, and by the end of August there was a complete shutdown by the three main American copper producers.

As if this was not enough there was also a stoppage of work at the Braden Mine in Chile during nearly the whole of October, and in the same month a strike in the New York docks which lasted until the beginning of December.

It was inevitable that under these conditions there should be continual and at times considerable fluctuations in the price of copper, which made things difficult for consumers and producers alike throughout the year. One can only hope that with the settlement of the various disputes more stable conditions will obtain within the industry during the current year.

The Outlook

With the return to normal working in the steel industry there are indications that business activity in the United States may reach a record level during 1960. If this proves to be the case the near term prospects are for a reasonably steady market in copper, particularly as the prolonged strikes of the past year have left supplies in the pipelines at low levels.

Once these have been restored to normal one would expect the market to be influenced by the fact that at present world production is potentially running ahead of world consumption. However, as I said at our Annual General Meeting in 1957, with an increasing world population, the trend towards higher standards of living in all countries and the consequent continual expansion of industry, I feel that this is likely to be a temporary state of affairs and that the long-term outlook is favourable for a substantial increase in world consumption.

Applying all these thoughts to our own fortunes I am confident that our results for the current year will be better than those presented to you today, and I continue to take an optimistic view of our long-term prospects.

The Year's Trading

Turning now to the year's trading, the final result was a net profit for the Group of £1,077,240 to which must be added a profit of £457,213 derived from the sale of investments making a total of £1,534,453.

Of this, the amount attributable to your Company was £1,406,706, which includes £145,212 received as its share of the maiden dividend declared by Mangula. Dividends numbers 18 and 19 absorbed £756,500; the whole of the profit from the sale of investments was transferred to Capital Reserve and the sum of £192,787 was placed to General Reserve.

As a result of the substantial allocations to Reserves made over the years and the addition of share premiums which accrued to the Company on the exercise of the options in July last year, the Balance Sheet shows a strong position with Capital Reserves and Surplus standing at over £8,000,000 as compared with the Issued Capital of £492,500.

Capital Proposals

As you will have seen from the Special Notice accompanying the Report, your Directors propose to capitalize £1,970,000 of the Share Premium Account and issue a scrip bonus in the ratio of 4 new shares for every unit of stock held. You will be asked to vote on this proposal at the Extraordinary Meeting which will be held here immediately after this meeting.

I hope you will support the resolutions when they are submitted, as, if passed, they will have the effect of bringing the issued capital more in line with the actual capital employed in the business, and should also result in a wider market in the stock units.

Issue by M.T.D. (Mangula) Ltd.

There is one other matter to which I should draw your attention before leaving the accounts and that is the recent issue of reserve capital by the Board of M.T.D. (Mangula) Limited. The purpose of the issue was to raise sufficient funds to repay your Company the balance outstanding on loan account.

I am pleased to tell you that the issue which was made last month at a price of 9/6 per share was fully subscribed, and as a result your Company has been repaid in full, while Mangula is now free of all indebtedness.

Messina had already a substantial holding in Mangula, and as it subscribed for its full quota of the new issue, the result from the cash point of view will be a net influx of £360,000. This money will be nearly sufficient to meet the capital expense of bringing the Alaska Mine into production leaving the balance to be provided from the Company's resources.

Looking back over the past ten years it will be seen that total assets of the Group (as it now is) have increased from £1,400,000 in 1950 to over £13,000,000 today, and that the expansion that has been brought about—rapid though it has been—has in no way been achieved at the expense of our financial position.

Operational Activities

From the financial I now turn to the operational activities of our Group, and commend for your attention the summary of the General Manager's Report which is included as usual with the Accounts. This contains full details of our operations, and I propose to confine my remarks today to what I consider were the most important features of the year's work.

Messina had a comparatively uneventful year, although it is pleasing to note that the Ore Reserves now stand at over 6,000,000 tons with a copper content of more than 100,000 long tons. When I first became associated with the Company twenty-five years ago, they stood at 1,218,000 tons containing 29,100 long tons of copper.

It is, of course, true that our mining grade is a good deal lower than it was when the mine was first opened up, and that for many years we have been treating ore which in early days would have been discarded as waste. But the programme of plant modernisation carried out over the past ten years, and the introduction of new methods combined with increased production and close attention to costs have enabled us to continue to produce our copper on a competitive basis.

Reduction in Costs

In this connection I may say that operating costs last year (including all overheads) were reduced to 31/11 per long ton of ore produced. The equivalent figure per long ton of recoverable copper based on the smelter output, which was less than last year, is £124. On a short tonnage basis the comparative figures are 28/6 and £111.

Mr. Spence, our Resident Manager and his staff and employees deserve our congratulations and thanks for achieving the reduction in costs to which I have referred.

I am glad to be able to report to you once again that our labour supply—both European and African—remains satisfactory and that the happy relations which we have always enjoyed with our employees continue to be a feature of our organization.

There is nothing of particular interest to tell you about Umkondo, where our programme for the removal of overburden, so as to make available by quarrying methods ore lying above the 100 ft. level, was continued throughout the year. This work should result in lower mining costs in the future.

Very Satisfactory Progress

From Umkondo I turn to Mangula where progress may again be considered as very satisfactory. Despite the fact that the benefits of production at the increased rate of 3,000 tons of ore per day were only effective during the last quarter of the Company's year, profits improved from approximately £4,000 to nearly £400,000.

Operating costs were reduced from the previous year's figure of 27/8 to 25/3 per short ton of ore treated, and I confidently expect a further substantial reduction during the current year.

During the year development was continued in the Norah area where we have already proved the existence of approximately 230,000 tons of ore better than average grade, and to facilitate this programme a new prospect shaft is being sunk 2,000 feet north of the original Brian shaft.

About 13 miles to the south-east of the Molly Section lies the Silverside Prospect on which an appreciable amount of development was carried out some years ago. We are now reclaiming one of the old shafts with a view to carrying out a thorough investigation of the area. We are also actively engaged in geochemical and geophysical exploration of various other parts of our property, and I hope to be able to give you the results of this work when we meet again next year.

With its promulgation as a township in a recent Government Gazette, Mangula may be described as well and truly on the map, and now it has settled down at its planned production rate of 3,000 tons per day, it will, I am sure, prove to be a valuable source of revenue to your Company.

Alaska

Turning now to Alaska, you will be pleased to hear that the work of preparing the mine for production is proceeding according to plan, and that the construction of the new smelter is actually ahead of schedule. I have every reason to believe that both these projects will reach the operational stage by the end of the current financial year.

We have appointed Mr. C. H. Chandler, who managed Umkondo so efficiently for four and a half years, as Resident Manager of both the Alaska Mine and the Smelter, and I have no doubt he will be equally successful in this new appointment.

Sanyati

Finally, I come to Sanyati, where as you will have seen from the Report, we are actively engaged in a programme of underground development from the Bradfield Shaft. The main purpose of this development is to obtain accurate information as to the size and shape of ore bodies already intersected by previous drilling. We need this information in order to determine the method of mining, and hence the most economic scale of production, as it is only after this has been established that detailed estimates can be prepared.

Comprehensive metallurgical tests have indicated that there should be no difficulty in treating the ore, although the precise method to be adopted has still to be decided. I hope to be in a position within the next twelve months to present you with plans for the exploitation of this property.

This brings me to the end of my review and it only remains for me to remind you that the results presented to you today could not have been achieved without the co-operation and loyal service of our staff and employees, wherever they may be serving. On behalf of the Board, I wish to take this opportunity of thanking them all, and in particular, Mr. P. O'B. Frost our General Manager who carries the responsibility for all our operations.

The Directors' Report and Balance Sheet and Accounts for the year ended September 30, 1959, were adopted.

The retiring Director, Mr. F. P. Grenfell, was re-elected and the remuneration of the Auditors for the past year's audit was fixed.

At the subsequent extraordinary General Meeting, the capitalization and scrip issue proposals were approved.

FINANCIAL NEWS AND RESULTS IN BRIEF

Tavoy Liquidation.—A progress report on the Tavoy Tin Dredging liquidation has been issued by the liquidator. After deducting the first liquidation distribution, a balance of about £65,500 remained available. Of this, about £40,000 was in Burma, and it appears that it will take some considerable time to remit this to the U.K. All Tavoy's saleable assets have now been disposed of, and when all expenses have been paid and the £40,000 has been returned to London, a final distribution of about 3d. per share should be possible.

English China Clays Scrip Issue.—English China Clays proposes a one-for-five scrip issue of £1 ordinary shares. Renounceable allotment letters will be posted on March 23. Subject to unforeseen circumstances, it is expected that the present 8¾ per cent dividend rate will be maintained on the increased capital. Net profit of the group after taxation for the year to September 30 last was £1,720,932, compared with £1,245,543.

Offer for Nigel Gold.—The board of Nigel Gold Mining has received an offer of 2s. per share for the entire issued capital of the company. The offer, which was made by the United Finance Corporation of South Africa, is under consideration, and a circular will shortly be circulated stating the Nigel board's attitude to the offer.

Asarco Earnings.—Earnings of the American Smelting and Refining Company in the year to December 31 last totalled $12,980,000 after tax, compared with $17,280,000 in 1958. This was equivalent to $1.74 per share, against $2.53 per share. The net earnings do not include a non-recurring gain of $15,801,000 from the sale of ASARCO's Garfield smelter and of shares in the Cerro de Pasco Corporation. The decreased earnings were largely due to the strikes which closed Asarco's plants for 113 days during the second half of 1959.

Exploration Company Rights Issue.—Subject to market conditions, The Exploration Company is to proceed with its one-for-fifteen rights issue, on April 20. The last date for acceptance of the provisional allotment letters will be May 6.

Bid for Alpha Consolidated.—Klippoortje Collieries have made an offer of either 8s. in cash or one Klippoortje ordinary share plus 7s. cash for every two Alpha Consolidated Witbank Collieries shares. The offer closes at 4.30 on April 19.

Lydenburg Offer Success.—The offer by Lydenburg Gold Farms of 1,000,000 shares at 3s. 9d. was subscribed to the extent of 93.3 per cent, leaving 6.7 per cent to be taken up by the underwriters.

Campbell Chibougamou Interim Report.—In the six months ended December 31 last, the net profit of Campbell Chibougamou was $722,174, compared with $204,642 in the corresponding period of 1958 and $433,209 for the whole of the 1959 financial year. During the same period, the grade of ore milled increased to 2.39 per cent copper and .0688 oz. gold. Compared with the period January-June, 1959, copper production was 11.5 per cent higher from 1.5 per cent less tonnage.

North Charterland Exploration Pays More.—North Charterland Exploration is recommending a dividend of 2d. per share for the year to December 31 last. This compares with 1½d. for the previous year. After all charges, the profit was almost doubled at £20,034. Miscellaneous credits totalled over £16,500, so that in spite of a transfer of £28,000 to general reserve and the £7,989 cost of the increased dividend, the carry forward was increased from £3,318 to £4,092. Meeting, Salisbury, May 16.

LORAINE GOLD MINES LIMITED

(Incorporated in the Union of South Africa)

REVIEW OF DEVELOPMENT OPERATIONS

CHAIRMAN'S SPEECH

At the Annual General Meeting of the Loraine Gold Mines Limited, which was held in Johannesburg on March 8, **Mr. B. L. Bernstein,** the Chairman said:

"The Directors' Report and Accounts, The Technical Adviser's Report and my Review of Operations, all of which have been circulated to Members give a comprehensive survey of the Company's operations. I should however, like to give you the up-to-date information available regarding your Mine.

No. 3 Shaft had reached a depth of 5,675 feet at the end of February 1960 leaving approximately 175 feet to be sunk to the planned final depth. The Shaft traversed the Elsburg series from 4,178 feet to 5,378 feet below the collar and as was anticipated no payable reef horizons were intersected. The "A" reef horizon was intersected at 5,496 feet below the collar and averaged 3.36 dwt per ton over a channel width of 115 inches equivalent to 386 inch-dwt. It is anticipated that the "B" reef will be intersected near the bottom of the Shaft.

Development from No 3 Shaft which is planned to commence in June 1960 will initially be concentrated on effecting a holing with the 52nd level haulage and on a high rate of advance on the 50th level. As soon as a holing is effected on the 52nd level work will commence on reef raises to connect up the 52nd and 50th levels at a number of points to provide an adequate number of stope faces on the Elsburg reefs and we now expect to be stoping in this area by the end of 1960.

In addition after the holing has been effected development will be directed towards opening up the area North of No. 3 Shaft on the 54th and 56th levels and a limited amount of work will be done between the 44th and 56th levels South of the shaft. At the end of February 1960 the 52nd level haulage had reached a position approximately 2,800 feet South of Borehole TV 2 leaving a distance of 3,700 feet to be covered to effect a holing with No. 3 Shaft. Much better progress than anticipated has been made in this haulage during the last two months and if the present rate of progress can be maintained a holing could be effected during June 1960.

During January and February 1960 1760 feet on the Elsburg reefs were sampled of which 59.7 per cent was payable at an average of 457 inch-dwt and 22.15 inch-lb.

Reef Development

In an endeavour to give Shareholders as clear a picture as possible I propose to deal in some detail with the reef development which has taken place to date from the 52nd level haulage.

Some 3000 feet North of Borehole TV 2 two bands of reef belonging to the Upper Elsburg series were intersected in a crosscut and raising was commenced. On the one band 260 feet have been sampled all of which is payable at 12.6 dwt and 0.72 lb. over a channel width of 64 inches equivalent to 808 inch-dwt and 45.87 inch-lb. On the other band 270 feet have been sampled all of which is payable at 10.2 dwt and 0.80 lb over a channel width of 57 inches equivalent to 579 inch-dwt and 45.87 inch-lb. A significant increase in values was encountered in these two raises as they approached the sub-outcrop against the boulder beds. The last 50 feet in these raises gave values of 26.3 dwt and 0.99 lb over 70 inches equivalent to 1844 inch-dwt and 68.98 inch-lb and 18.6 dwt and 0.91 lb over 59 inches equivalent to 1099 inch-dwt and 53.78 inch-lb respectively. 500 feet South of the crosscut already mentioned, i.e. 2500 feet North of Borehole TV 2, another crosscut intersected two bands of reef of the Upper Elsburg series. Raising has commenced here and a total of 65 feet in two raises has been unpayable. To the South of this reef development the Upper Elsburg zone moves further into the hanging wall as the 52nd level haulage progresses southwards and no other development has taken place on these Upper Elsburg reefs.

As the haulage proceeded South a number of boreholes were drilled at varying distances to the fringe of or into the Upper Elsburg reefs for the purpose of obtaining structural information as an aid to future development planning. Some of these were drilled only far enough to make contact with the bottom of these upper reefs and others were drilled through a multiplicity of uncorrelated reefs and it is not possible to obtain a valuation on the basis of this information either statistically or other wise. When development is undertaken on these upper reefs a picture will be obtained. The values obtained in these borehole intersections ranged from a trace to 3318 inch-dwts but it would be most misleading to endeavour to strike an average or to attempt any sort of evaluation on these results. However the boreholes can be said to have indicated continuity of these Upper Elsburg reefs over some 4,500 feet on strike.

On the Lower Elsburg zone development on a reef band is in progress from a crosscut 1,000 feet North of Borehole TV 2. Of 185 feet sampled to date 97.3 per cent is payable at 31.6 dwt and 0.67 lb over a channel width of 10.9 inches equivalent to 344 inch-dwt and 7.30 inch-lb. From another crosscut very close to the position of Borehole TV 2 development on a reef band in the Lower Elsburg zone is in progress and 95 feet have been sampled to date all of which is payable 50.4 dwt and 0.69 lb over a channel width of 23.5 inches equivalent to 1,184 inch-dwt and 16.20 inch-lb.

The development from these two crosscuts is the only development to date in the Lower Elsburg zone. Indications to date from this development and from the cover holes drilled is that this zone which lies only 130 feet West of the 52nd level haulage is continuous for a distance of some 4,500 feet on strike, that the percentage of payability is likely to be high and that the grade of ore from this zone could be of the order of 12 dwts.

Unless there is a hold up in the advance of the haulage and the crews are available for development it is improbable that any further development will be achieved from the 52nd level haulage until a holing is achieved.

In order to clarify the position of the development near Borehole TV 2 in relation to this borehole I have had this sketch prepared which you are invited to examine. The sketch shows a simplified section through the Elsburg zone from East to West and it will be seen that the borehole intersected high grade reefs in the Lower Elsburg zone some 300 feet below the 52nd level horizon. The raise from the 52nd level crosscut nearest TV 2 is proceeding Westwards and away from the borehole. No positive correlation has yet been made between the reef in the raise and that in the borehole. In due course levels will be established below the 52nd level and raise connections will be made. The high values in the Upper Elsburg reefs intersected in Borehole TV 2 are approximately 300 feet above the 52nd level horizon and no development has been done on these reefs in this area.

Shareholders will observe that a simplified model showing the geological structure between No. 2 and No. 3 Shafts has been prepared. Those shareholders who are interested are invited to inspect this model after the conclusion of the Meeting. The Company's technical staff will be available to explain it.

Chairman's Replies to Questions

In reply to questions asked by Members the Chairman said:

"The reason why the Company anticipated holing through to No. 3 Shaft in June instead of before the end of the year, as stated in the Chairman's review, was because progress had been very much better than anticipated and it had been possible to by-pass a known fissure which might have held up the advance in the haulage.

The rate of pumping at the mine was 600,000 gallons per day as compared with the other mines in the Orange Free State which vary from 300,000 to 7,000,000 gallons per day.

The delay between the time that No. 3 Shaft will reach its final depth and the time that development from the shaft can commence will be due to the work which must be done at the bottom of the shaft. This includes the installation of loading boxes and measuring flasks, pumping equipment etc.

The increase in working costs per ton milled was due to the drop in tonnage milled. The tonnage milled over the period July 1959 to January 1960 decreased from 82,000 to 75,000 tons per month while total working costs remained constant.

Development towards Borehole VDH 1 will not be done until some time after a holing in No. 3 Shaft has been effected.

Further boreholes will not be drilled between TV 2 and No. 3 Shaft. Cover holes will be drilled in the normal course of operations.

It is too early to state where or when another shaft will be sunk but shareholders can accept that another shaft will be required at some future time depending on progress at the Mine.

No assessment can yet be made of the tonnages of ore available.

Separate development results for different zones of the Elsburg reefs could not be made available when publishing the Quarterly Reports.

The present milling capacity is 82,000 tons per month. The present shaft system when complete will be capable of hoisting and sending to the mill 160,000 tons of ore per month.

The Motion for the adoption of the Directors' Report and Accounts was seconded by Mr. C. S. McLean and was carried unanimously.

Publications Received

Kemp's Engineer's Year-Book, 1960. *65th Edition. Published by Morgan Brothers (Publishers) Ltd. pp. 3,000. Price (two volumes in case) 87s. 6d. (plus postage 2s. 6d.).*

The new edition of this well-known reference work has been revised to cover recent advances in science and practice of engineering, and contains 120 pages of new tables and text. The chapters on Electronic Engineering, Nuclear Power, Prestressed Concrete, Diesel Locomotives and Railcars, are among those which have been completely rewritten, while the issuing of new and revised British Standards has been reflected by numerous alterations and additions. As in previous editions, every effort is made to cover the details of all the more important aspects of engineering, and to enable those details to be quickly found in a comprehensive 120-page index. Most chapters include a bibliography giving a list of standard works on the subject. The new issue is fully up to previous standards and forms an invaluable source of reference for those engaged in all branches of engineering.

★

Bulletin Scientifique et Economique du B.R.M.A., No. 5, published by the Bureau de Recherches Minières de l'Algérie (Algerian Office of Mineral Research), is mainly devoted to the Karézas arsenic and tungsten deposit, situated 12 km. west of the port of Bone.

This deposit was conceded in 1928 to the société des Mines de Karézas, which exploited arsenic in a modest scale up to 1942, when Péchiney became interested in the occurrence with a view to the production of wolfram and set up a treatment plant. Extraction of wolfram began in 1949 and continued until the beginning of 1953, when it was suspended on account of unsatisfactory recovery at the concentrator. This necessitated the complete reconstruction of the existing plant, but the cost appeared too heavy in relation to the proved tonnage. The Société des Mines des Karézas was then faced with three major tasks: to study the treatment of the mineral and reconstruct the plant; to undertake exploration in order to increase the known reserves; and to improve the method of exploitation in order to reduce the cost of the minerals extracted. The Algerian Office of Mineral Research was asked to undertake the programme and the present bulletin summarizes its work. The three projects are in course of realization and should permit the company to resume production under satisfactory conditions as soon as wolfram prices return to normal.

★

A Survey of the Uranium Industry in Canada, by J. W. Griffith. Published by the Department of Mines and Technical Surveys, Ottawa, Mineral Recources Division, as Mineral Information Bulletin MR 34. Price 50 c. This report is a summary of information on the Canadian uranium industry up to the end of 1958 but includes some developments up to the end of November, 1959, including the 'stretch-out' plan for delivery of uranium to the end of 1966. It brings into a single volume a description of all Canadian producers and former producers. The report deals with Canadian uranium production in 1957 and 1958 and also covers ore reserves, world production and reserves, mining and milling methods, costs, refining, uses, prices, markets, and a brief outline of thorium in Canada.

★

The Jubilee Number of *The Mining Electrical and Mechanical Engineer*, 1909—1959 contains two fascinating surveys of progress during the past half-century by S. W. Richards and A. E. Crook, who deal respectively with mining- electrical engineering and mining-mechanical engineering. A forecast of developments in the next half century is given by H. E. Collins, who concludes that dependence on machines over the coming 50 years will be much more pronounced and the men employed in our mines will become more and more machine-minded. The further extension of mechanisation in the mines will require competent engineers to design the machines, well-qualified mining engineers to plan the operations, and fully-trained men to operate and maintain the machines.

★

Inco-Mond Magazine No. 12, features important applications of the austenitic nickel containing stainless steels in many industrial and domestic fields. Architectural metal work, catering and food processing plant are made from nickel containing stainless steels because of their fabricating and corrosion-resistant qualities. Articles in this issue of the magazine illustrate typical applications. Inco-Mond magazine is obtainable free on request from The Mond Nickel Co. Ltd.

★

Economic Geology, Volume 54, Number 8, December, 1959; published by the Economic Geology Publishing Co. of Lancaster, Pa., U.S.A. Price $1.25. Among many papers of interest, this issue contains articles on "Sulfide orebodies at Yauricocha, Central Peru" by H. J. Ward; "The Titanium mineralogy of certain bauxites" by J. A. Hartman; "The geochemistry of Rhenium, with special reference to its occurrence in molybdenite" by M. Fleischer; and "The geology of Torbrit Silver Mine" by F. A. Campbell.

★

Metallurgical Society Conferences *Vol. 2, Reactive Metals*, edited by W. R. Clough, pp. 160. Price 113s. *Vol. 2, Quality Requirements of Super-Duty Steels*, edited by R. W. Lindsay. pp. 309. Price 64s. *Vol. 4, Physical Metallurgy of Stress Corrosion Fracture*, edited by Thor N. Rhodin. pp. 394 Price 98s. Produced by Interscience Publishers Inc., 250 Fifth Avenue, New York1, N.Y.

Reactive Metals comprises the Proceedings of the Third Annual Conference sponsored by Niagara Frontier Section in co-operation with the Metallurgical Society, American Institute of Mining, Metallurgical and Petroleum Engineers, held at Buffalo, New York, on May 27-29, 1958.

Decisions were reached by the general Chairman and by the Programme Committee as to the metals to be considered as "reactive"—and hence to be applicable to the conference. The final list included titanium, zirconium, hafnium, thorium, vanadium, columbium, tantalum, molybdenum, tungsten, uranium and rhenium. At least one paper pertaining to each of these materials is included in the volume.

An objective of the conference was to present survey and research papers and discussion dealing with the reactive metals that might be of considerable importance in the future. The technical papers and discussions assembled in the present volume should enable industry in general to become more thoroughly conversant with the problems these metals present and with fields of application.

Vol. 3 is a collection of the papers and discussions presented at a technical conference sponsored by Physical Chemistry of Steel-making Committee of the Iron and Steel Division, and Institute of Metals Division, the Metallurgical Society, and Pittsburgh Section, American Institute of Mining, Metallurgical and Pentroleum Engineers. This conference took place at Pittsburgh, Pennsylvania, on May 5-6, 1958. The term "Super-Duty Steels" was defined as including steels which have to resist unusual and severe environments, or which have chemical, mechanical and physical properties that are much superiar to those of conventional carbon steels. Steels used in many exotic applications are thus included; e.g., most stainless steeds, high-strength alloy and carbon steel, and steels for meeting the needs of high-temperature or low-temperature service.

Vol. 4 contains the Proceedings of a symposium on the Physical Metallurgy of Stress Corrosion Fracture, arranged by the Committee on Corrosion-Resistant Metals, of the Institute of Metals Division, Metallurgical Society, and Pittsburgh Section, American Institute of Mining, Metallurgical and Petroleum Engineers, held at Pittsburgh on April 2-3, 1959. Today, the pressure of major advances in concepts of design is seriously pushing against the operational limits of many engineering materials. This is particularly true for the problem of stress corrosion, where the demands of technology on the development of new materials are particularly critical in such areas as power generation, chemical processing, and nuclear technology. The main objective of the symposium was to provide a forum of discussion among specialists from divergent fields.

★

The Nickel Bulletin—December, 1959. The section covering literature on heat-and corrosion-resisting materials forms an interesting feature of the December, 1959, issue of The Nickel Bulletin, and of particular interest are the thirty-four abstracts indicating the scope of papers originally presented at a Symposium on High-Temperature Materials sponsored by the American Institute of Mining, Metallurgical and Petroleum Engineers and now published in book form. The remainder of the items in this section summarize the salient findings of work carried out to evaluate the corrosion-resistance, high-temperature properties or weldability of various nickel-containing alloys and steels.

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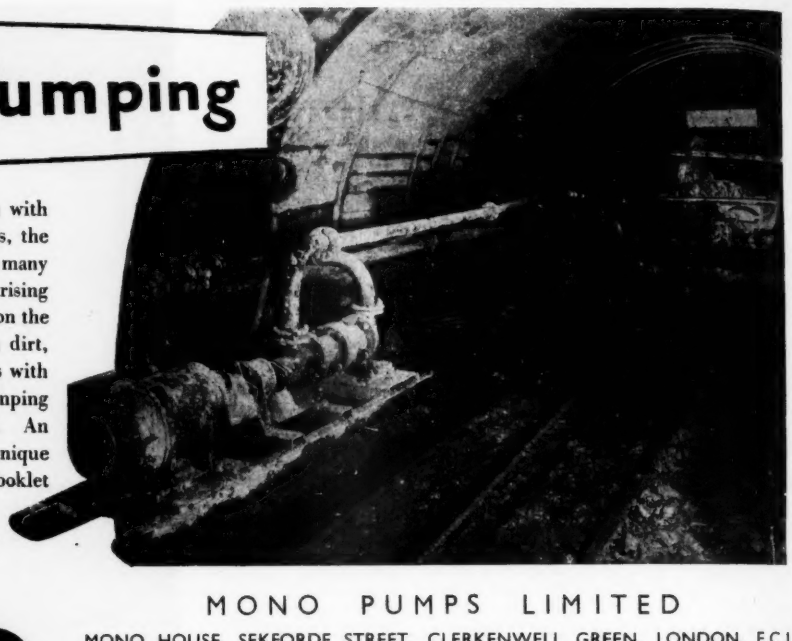

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This feature appears every fourth week

Personal

Mr. G. J. W. Turner, chairman of Wrights' Ropes Ltd., joined the Board of the Lancashire Steel Corporation.

★

Mr. R. B. Smart, A.R.S.M., M.I.M.M., senior consulting engineer, New Consolidated Gold Fields Ltd., Johannesburg, and consulting engineer, West Witwatersrand Areas Ltd., retired on March 1, after 33 years' service with the Gold Fields Group. Before joining head office Mr. Smart was manager of The Sub Nigel Ltd., and previously manager of Vlakfontein Gold Mining Co. Ltd. He was educated at Bedford School, England, graduated at the Royal School of Mines, London, and is a member of the Institute of Mining and Metallurgy, London. During his service on the Witwatersrand Mr. Smart served on the Technical Advisory Committee of the Chamber of Mines, on the Prevention of Accidents Committee and the Government Miners' Training Schools.

★

Mr. W. Hinrichs has been named manager of the newly-formed Exploration Services Department at Fairchild Aerial Surveys Inc. He will be assisted by Mr. W. Kellogg who will be chief geophysicist for the department. Fairchild Aerial Surveys Inc., is a wholly-owned subsidiary of Fairchild Camera and Instrument Corporation.

★

Mr. J. R. Cotterill has been appointed manager of the Outside Services Department at the Witton Works of The General Electric Co. Ltd. This is a new department formed to co-ordinate erection, commissioning, and post-commissioning service of electrical plant.

★

Mr. R. S. H. Shepard, M.C., T.D., F.C.A., and Mr. L. B. Devins have been appointed joint managing directors of The Sheffield Wire Rope Co. Ltd., a member of the Firth Cleveland Group.

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LONDON METAL AND ORE PRICES, MARCH 17, 1960

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 10s. 6d. lb.
Cerium (99%) net, £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 14s. lb.
Germanium, 99 99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. ¼d.
Iridium, £23/£25 oz. nom.
Lanthanum (98%/99%) 15s. per gram.
Manganese Metal (96%/98%) £275/£285
Magnesium, 2s. 2¼d./2s. 3d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £22/£24 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/28¼
Quicksilver, £70½/£71 ex-warehouse
Rhodium, £45/£48 oz.
Ruthenium, £16/£18 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 79¼d. f. oz. spot and 78¾d. f'd
Tellurium, 21s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis		19s. 6d./21s. 6d. per unit, c.i.f.
Beryl (min. 10 per cent BeO)		230s. per l. ton unit BeO
Bismuth		65% 8s. 6d. lb. c.i.f.
		18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifriable 48%)	(Ratio 3 : 1)	£15 15s. 0d. per ton c.i.f.
,, Hard Lumpy 45%	(Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
,, Refractory 40%		£11 0s. 0d. per ton c.i.f.
,, Smalls 44%	(Ratio 3 : 1)	£14 0s. 0d. per ton c.i.f.
Baluchistan 48%	(Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) Nb_2O_5 : Ta_2O_5		175s. per l. ton unit c.i.f.
Fluorspar—		
Acid Grade, Flotated Material		£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)		156s. 0d. ex. works
Lithium Ore—		
Petalite min. 3½% Li_2O		47s. 6d./52s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O		47s. 6d./52s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O		75s/85s. per ton f.o.b Beira
Magnesite, ground calcined		£28 0s./£30 0s. d/d
Magnesite Raw (ground)		£21 0s./£23 0s. d/d
Manganese Ore Indian—		
Europe (46%-48%) basis 67s. 6d. freight		73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)		69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)		nom.
Molybdenite (85%) basis		8s. 11d. per lb. (f.o.b.)
Titanium Ore—		
Rutile 95/97% TiO_2 (prompt delivery)		£28 0s. 0d. per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO_2		£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)		148s./152s. per unit c.i.f.
Vanadium—		
Fused oxide 95% V_2O_5		8s./8s. 11d. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2		£16/£16 10s. ton c.i.f.

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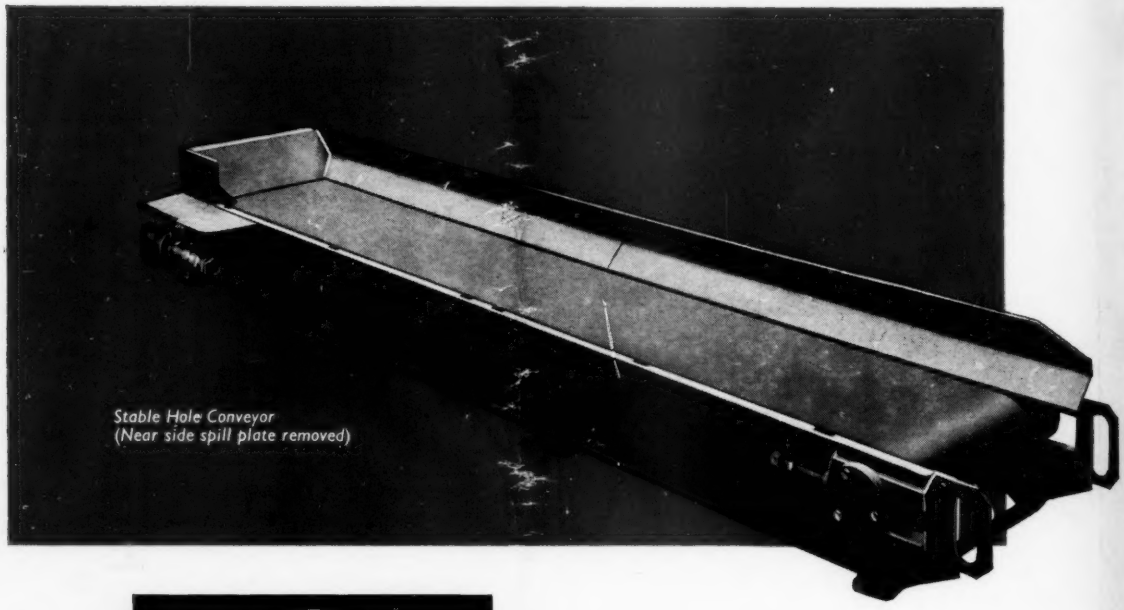

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